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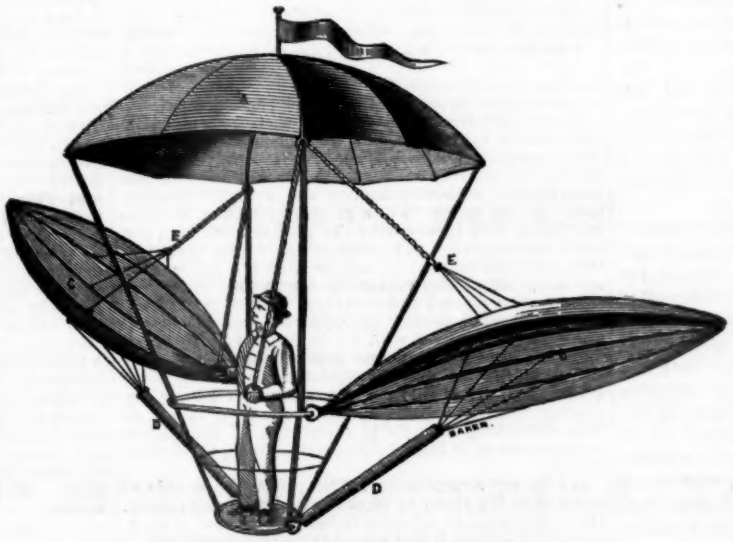
AIR NAVIGATION.

At a late meeting of the London Aeronautical Society, Mr. Chalon submitted the plan for air navigation represented in the accompanying engraving. The novelty in his plan consists in using the recoil of the springs, DD, as the force for raising the machine, by this means securing a quicker motion than the direct action of muscular power could produce and sustain; the sudden recoil, having the effect of a blow, utilizes the property of inertia which air, in common with all matter, possesses.

The success of a device of this kind depends upon the velocity that can be given to the wings. If a sufficient velocity can be attained to compress the air beneath, so that its reaction per unit of surface equals the weight of the machine, man included, for the same unit of surface, the apparatus will doubtless float or sustain itself.

The maximum resistance which air is capable of affording is represented by its weight or pressure on the surface of the earth. Experiments have shown that air rushes into a vacuum with a velocity of about 1,200 feet per second, from which we conclude that we must give our wings a velocity of 1,200 feet per second in order to produce an upward pressure of 14.5 pounds to the square inch, which is the pressure air exerts at the earth's surface. From this fact we can deduce the required ratios between the weight, surface in motion and velocity, necessary to sustain the machine.

The equation of equilibrium will be, calling w and W repectively the weights of the air and machine, s the area of the wing surface, and v the velocity in feet per second of the *downward* motion of the wings: $\frac{v \times s}{w} = \frac{1200}{v}$. Knowing any three of these terms we can find the fourth. The weight of the air is 14.5 pounds per square inch. Assigning an area of effective wing surface of 60 square feet, or 8,640 square inches, and the total weight at 200 pounds, we have $\frac{14.5 \times 8,640}{200} = \frac{1,200}{v}$. From this we deduce that a velocity of 1.9 feet per second, for a constant downward motion of the wings, is necessary to sustain the given weight. If we now consider that the upward motion will destroy at least one-half the effect, and consume one-half the time, we must increase this velocity two and one-half times, giving for the practical velocity about 5 feet per second. Supposing the center of the wing to move through an arc of five feet in length at each stroke, it must make sixty strokes a minute in order to sustain itself, and a somewhat higher velocity to attain a motion either upward or forward.



The Chalon Aerial Machine.

—The total exports of rails from Belgium in May amounted to 15,794 tons, as compared with 13,394 tons in May, 1869, and 4,377 tons in May, 1868. The total of 15,794 tons was made up as follows: Russia, 6,492 tons; the Zollverein, 4,742 tons; France, 1,515 tons; Italy, 407 tons; Turkey, 2,260 tons; the United States, 189 tons; and other countries, 189 tons. The aggregate exports of rails from Belgium in the first five months of this year were 50,617 tons, against 41,895 tons in the corresponding period of 1869, and 27,597 tons in the corresponding period of 1868.

Contributions.

THE LOCOMOTIVE PRACTICALLY CONSIDERED.

BY WM. S. HUNTINGTON.

Since the days of George Stevenson the locomotive has been the pet of engineers and mechanics, and there is no other form of the steam engine that may be considered so near perfection. Although other classes of steam engines have undergone greater changes in their general form, and have, from time to time, received improvements of great importance, they have not reached that perfection to which the locomotive has attained in all the details of its general "make-up," which so admirably adapts it to the service it is designed to perform.

Improvements in the locomotive have not been characterized by any startling discoveries, or rapid progress toward perfection; but have been added little by little, from day to day, until there seems to be but little room left for improvement. It is true that in some respects the locomotive "of the period" is not all that is desired, but perhaps the greatest field for improvement lies in the material of which it is made, rather than in any change in form or arrangement of parts.

It is related that years ago, when the first railroad in the United States was in course of construction, that a party of Members of Congress were on their way to the National Capital. While journeying by stage over the mountains of Pennsylvania and Maryland, one of the party ventured to remark that the day would come when people would travel by steam among those hills and mountains, at the rate of ten miles an hour. This remark was the occasion of much mirth for the remainder of the journey, as none of his companions had any faith in his predictions. At that day, he who would predict that steam-carriages would travel at the rate of fifteen miles an hour, was considered a fool or a lunatic. The traveler of to-day would not consider a person insane for believing that it is possible to travel by rail at one hundred miles an hour if that speed were necessary to satisfy the damands of the traveling public. At all events, the locomotive of to-day is all that is required in regard to speed, and no improvements are needed in that direction. Indeed, the capacity for speed in American locomotives is far greater than is necessary, as there are but few roads in the country with track in condition to enable locomotives to run to the extent of their speed with safety. Let railroad managers put their track in a safe condition, and any speed they may wish trains to run is forthcoming.

The power of our best locomotives seems to be all that is desired on roads of easy grades; but, on roads less fortunate in this respect, more power is desirable. A great deal of brain labor has been expended for the purpose of increasing the power of locomotives, but it does not appear that any late effort has been successful. At least, there were freight engines in use several years ago, that performed equally as well, and in some cases rather better, than many of those now in use. Even as far back as eighteen or twenty years ago, the Rutland & Burlington road, which was equipped with somewhat light build of Taunton locomotives, procured four monstrous, ugly-looking freighters from the Amoskeag Works, Manchester, N. H. They were mounted on the ordinary four-wheeled trucks, with six-coupled driving wheels. If I remember rightly the diameter of the drivers was four feet two inches. It was their practice with heavy freights to double over Mount Holly with their little Taunton engines, but it was expected that the Amoskeags would take any train over the mountain single-handed. They were disappointed, however, and after using them a year or more, they were laid aside and sold, the Tauntons being far superior for both freight and passenger business. The same type of engine as the Amoskeags (usually called ten-wheelers) has been used on many roads, but has generally failed to give satisfaction. It is difficult to see in what way the addition of an extra pair of drivers will increase the effective power of a locomotive. It certainly must involve a loss of power in friction, not only in the bearings of the extra wheels, and the connections but the increased length of wheel base must result in tremendous friction and binding on curves, which, all combined, would absorb considerable power, so that the extra pair of wheels may be regarded as an incumbrance rather than a benefit. With some locomotive builders, weight seems to be inseparable from power, and to a certain extent this is correct, but the weight must be properly distributed to be effective. There is no reason why an engine of 25 tons, with an equal weight on the drivers, should not be as powerful as a 40-ton engine, all other things being equal. It was formerly considered that a powerful locomotive must necessarily be a heavy one, but recent experience proves to the contrary; and the question of dead weight is receiving considerable attention from leading mechanics and engineers, in the construction of both cars and locomotives. There is no doubt but that the material for the construction of rolling stock may be so far improved as to render it possible to reduce the weight to a considerable extent, and still maintain the strength requisite for safety. The great obstacle in the way of reducing the weight of freight engines below certain limits lies in the difficulty of getting the necessary adhesion to the rail with a light engine. It has been proposed to overcome this difficulty by placing a toothed rack on the inner side of each rail, the drivers being provided with a suitable toothed projection on the inner side of the flanges, which teeth, or cogs, mesh into those of the rack and thus will prevent slipping. Something of this nature has recently been patented, but it does not appear to be practicable in many sections of the country, for obvious reasons, and it is extremely doubtful whether it will "stand the pressure" in any part of the country. It is proposed to place the rack only on such portions of the road as have heavy grades, and if, on the locomotive reaching the end of the rack the cogs on the drivers do not meet those on the rack properly, (and it is an even chance whether they do or not,) it would be likely to cause mischief.

But notwithstanding this difficulty of lack of adhesion in light engines, the weight of most freight engines may be greatly reduced without relieving the drivers for that purpose. There seems to be an uncontrollable desire on the part of many railroad managers to stock

their roads with the heaviest locomotives they can procure, and some of them, who have acted in the capacity of engineers in their day and have had opportunity to see the evil of it, do not seem to have gained anything by experience. It is not uncommon to see on a poverty-stricken road a monstrous, heavy engine drawing a passenger train over a light rail, supported with here and there a small crooked tie, ballasted with soft mud, or hard clay, the weight of the engine bending and warping the iron out of shape, while the cars scarcely make any impression upon it. The enormous expense of track repairs is, on many roads, due in a great measure to running locomotives that are far too heavy for the weight of rail and the nature of the superstructure. It is also the cause of much needless expense in repairs of rolling stock; for the track cannot be kept in good repair, and of course a bad track will soon bring rolling stock to grief. In providing locomotives, the weight of rail and nature of road-bed should always be taken into consideration.

It seems to be the prevailing opinion of engineers that engines with outside connections are more effective than those with inside connections, but practice does not prove the superiority of outside connections. A principal feature in favor of the outside-connected locomotive is accessibility, which is certainly a very good point in any machinery; but in the case of the locomotive it can only be gained by the sacrifice of other good points of far greater importance which will be mentioned hereafter. Probably one reason why there is a greater number of outside-connected locomotives in use is the greater convenience in the manufacture of that style of engines, although it is concluded by many that, theoretically, the placing of the cylinders outside would give a slight advantage in power over the inside connections, this is a point in which the "doctors disagree," and "who shall decide?" Locomotive engineers become attached to their machines as do sailors to their ships or teamsters to their horses, and it is difficult to convince them that they are not running the best engine on the road, either in point of power or speed. It is a noticeable fact that on roads stocked entirely with outside-connected locomotives, they are considered superior to any other build, and *vice versa;* while engineers on roads using both kinds, each claim superiority over the other. But as these claims are, in most cases, merely opinions, not founded on actual tests, they are of little worth in deciding the merits of the two classes of locomotives.

This is a matter of considerable importance—a matter of dollars and cents—and is worthy the attention of railroad managers. The most stubborn adherent to the principle of outside connections will acknowledge that such engines are more given to oscillation than those with inside connections. The oscillation of those engines has a tendency to destroy permanent way to a greater extent than is generally supposed, and doubtless, if the extra expense of track repairs occasioned by the use of this class of engines were known, they would be discarded. A person accustomed to ride on an outside-connected locomotive will not fail to notice, on giving it a trial, the remarkable stability of the inside-connected engine and the apparent ease with which it performs its labor; while the outsider heaves ahead one side at a time, throwing the track out of line and bringing speedy destruction to bridges and trestle work. Stand on a bridge while trains are passing and you will notice that an outsider causes a fearful vibration which seems to rack the bridge to its foundation; when engines with inside connections will only cause a slight trembling. Track iron is rapidly worn by the abrasion of driving flanges on outside-connected locomotives and they are more likely to jump the rail, for the power is applied in such a manner as to throw the flange of the driver against the rail with great force. The damaging effect of the outside connections on a permanent way has been noticed on roads using both kinds, each style of connection being run exclusively on certain portions of the line for a time, and then changed, when the difference was shown to be clearly in favor of the inside connections.

Although it is the practice with many master mechanics at the present day, in rebuilding locomotives, to fit them with outside connections (probably on account of convenience), there are some fast lines that still continue the use of the inside connections, which seem to be the favorites with their engineers, and, with two exceptions, may be considered superior in every respect to the outsider.

The first of the objections, that of inaccessibility for purposes of repairs, cleaning, etc., cannot be remedied, but for the other—liability to breakage of crank axles—there is a specific remedy. The tendency of crank axles to break (the reason for which is obvious), has been a serious objection to the use of inside connections; but with the recent improvements in material for that purpose, together with the new mode of construction, it is possible to make the crank axle as reliable as any other. These axles are now formed up of pieces, in such a manner as to secure far greater strength than was possible by forging them whole, and although the operation is rather an expensive one, the expense can hardly be regarded as an objection, inasmuch as a great saving may be effected by its use, as above mentioned.

TO BE CONTINUED.

Superheated and De-aerated Water.

Mr. A. Guthure, of Chicago, late United States Inspector of Steamboats, writes as follows to the *American Artisan* on the above subject. His experiments and his opinions will attract the attention of all steam users:

In the *American Artisan* of the 20th inst. (page 45) I was pleased to find some communications from correspondents of your valuable paper in reference to boiler explosions being caused by de-aerated and "superheated" water. This theory—that water deprived of its natural proportion of air can ever be heated above a boiling point due to the pressure, and in consequence become explosive—has, in my humble opinion, gone far enough to meet a positive contradiction. A theory advanced by M. Donny, an obscure chemist, as long back, perhaps, as 1770, being of itself simply ridiculous, has found advocates up to the present day. That this theory has been copied into many works on chemistry and science, and assented to by learned men during one hundred years, excites my wonder; but that it has not found its refutation in its own absurdity seems to me still more singular. I am glad to see that at least one of your correspondents, Mr. Geo. B. Brayton, has the boldness to contradict it.

I have made many experiments to satisfy myself of the truthfulness of this theory, and have endeavored to conduct them with perfect fairness and impartiality, and with all the care that my feeble abilities would permit. I am entirely satisfied that there is not a shadow of truth in the Donny theory, that water deprived of air boils at a higher temperature or at any different temperature than water not so deprived; nor is there any foundation whatever for the statement that such water has the slightest explosive tendency more than any other water. I mean, exactly that it will boil at 212 deg. Fahrenheit when other water does, and that it will come to the point of ebullition without a particle of tendency to explosion, no more than other water—just this, exactly.

I concede that Prof. Tyndall has in his lectures in a manner given credit to his theory; but the moment after and before concluding he disclaims his belief in it so plainly that he need not be misunderstood.

I admit that Brand and Taylor in their work on chemistry (which, by the bye, is a work of exceeding value), with many other distinguished writers, have adopted this theory as a true one; but I am led to think it has been adopted without reflection and without investigation. It may appear to be a great presumption in me to contradict this theory with the positiveness I do; but did I not suppose I had given it the fullest investigation, with just as good means to give it a fair trial as any one, I should not venture to contradict.

In the first place, I assume as true that all natural water has a small percentage (say two and a half) of atmospheric air mixed with it; in this I believe we all agree. Now, then, I assume that this air may be expelled in the process of congelation, by boiling for a given time, by distillation out of contact of air, by placing it *in vacuo*, and by being absorbed in fish or water-breathing animals in their kind of respiration. I suppose there is little difference of opinion upon these points.

(1.) In my experiments, I first procured a sample of water from the boiler of an ordinary condensing engine. Here, of course, in addition to being subjected to long continued boiling, it had passed through the vacuum.

(2.) I procured a sample from the ordinary high-pressure non-condensing engine boiler, which before entering the boiler had passed the heater at 210 deg.

(3.) I procured some clean snow and dissolved it under oil, so that there was no contact with the air.

(4.) I froze some water in a long, upright tube, using only the lower end of the ice when removed from the tube, and dissolved it under oil.

(5.) I placed a bottle of water under a powerful vacuum pump, worked by steam for two hours, agitating the water from time to time to displace any air that might possibly be confined in it, then closed by a stop-cock so that no air could possibly return.

(6.) I boiled water in an open boiler for several hours, and filled a bottle half-full, closed and sealed it up, so that when it became cool it would in effect be under a vacuum; agitating it as often as seemed necessary.

(7.) Another bottle was filled with the same and sealed.

(8.) I next took some clean, solid ice, dissolved it under oil, and brought it to a boil, which was continued for an hour or more, after which it was tightly corked.

(9.) I procured a bottle of carefully distilled water, after long boiling and having been perfectly excluded from air during the distillation.

(10.) I obtained a large number of small fish, placed them in pure clean water in an open-headed cask in a moderately cold night, so that very soon it became frozen over, consequently excluding the air, the fish breathing up the air in the water so that (if I am correct in this theory) a water freed from air would be the result: but in *some* of these different processes, if not in all, I was likely to free the water from air, if it could ever possibly occur in the ordinary course of operating a steam boiler.

Having procured a good supply of glass boilers adapted to my purpose, and so made that the slightest changes could be noted, and using as delicate thermometers as I could obtain, I took these samples, one after another and brought them to the boiling point; and every one, with no variation whatever, boiled effectually and positively at 212 degrees Fahrenheit, or *under:* nor was there the slightest appearance of explosion to be observed. From these experiments, with others, I am persuaded that the theory of Mr. Wye Williams is the correct and true one: namely, that water begins to boil from the first moment that heat is applied; for by inserting delicate silk fibres currents were indicated early in the process, and increased continually up to the boiling point, which in several instances seemed to be reached before 212 degrees.

In reference to the real cause of steam-boiler explosions, there is no longer any want of information, nor is there any mystery connected with it. The majority of engineers now understand it well enough; that is, in ninety-nine cases in every hundred the explosions occur from a want of water in the boiler. I refer with some little pride and satisfaction to the report of the Board of Supervising Inspectors for 1869–70, by which it will be seen that in six districts out of the ten in which the country is divided not a single explosion occurred during the past year, and not over seven in all the others. Think of that, only six or seven steamboat explosions in all this vast country.

Our Shipping Interests and the Diversion of Breadstuffs to Canada.

The course of the movement in flour and wheat during the past few weeks or since the war broke out in Europe has been unusual. It will be remembered that Congress refused, on the call of the President, to make such a modification of the revenue laws as would permit the purchase of foreign built vessels. The war banished from the high seas all the shipping sailing under the North German flag, embracing nearly one-half the foreign tonnage in our port; there was consequently an immediate advance of about one hundred per cent. in the rates of freight or charter from this to European ports. This was felt severely in our wheat market; an advance of wheat in Liverpool Equal to fifty cents per bushel in our currency, and an advance in gold equal to ten cents more, or sixty cents in all, was responded to in this market by an advance of only twenty cents per pushel; the whole producing interest of this country failed to the extent of the difference in reaping the advantage it was entitled to from the flurry into which the declaration of war threw the markets for breadstuffs throughout the world. But besides this, it would appear that the Erie Canal and the great trunk railroads have been deprived, by the same cause, of a large share of the business which properly belongs to them, and which can only be driven elsewhere by an abnormal condition of affairs. The Canadas usually receive but a small proportion of the wheat grown in our Western States. They neither require much of our wheat for their own use nor have they heretofore afforded facilities for the movement of any considerable quantity going to foreign countries. Usually they take moderately of our cheaper spring wheat, and send us in return their better and dearer winter wheat. But we have witnessed in the past four weeks, a most remarkable diversion into Canada of breadstuffs moving eastward from the great lake ports of Chicago, Milwaukee and Toledo, to the great loss of the Erie Canal and the great railway lines, to say nothing of other important interests depending directly for their prosperity upon the forwarding, handling, and transhipment of grain, at and between New York and Buffalo. Statistics prepared for the *Chronicle* show that during the four weeks ending August 13th, there were shipped eastward from Chicago, Milwaukee and Toledo the aggregate of 3,258,000 bushels of wheat, of which no less than 1,461,000 bushels, or nearly one-half, went to Canada, leaving but little more than one-half, or 1,797,000 bushels to come to Buffalo and Oswego. The movement may be further and forcibly illustrated by the following Montreal figures for one week. We have not at present the figures for the other weeks:

RECEIPTS AT MONTREAL WEEK ENDING AUG. 13.

	1869.	1870.
Flour, barrels	22,600	32,400
Wheat, bushels	172,900	437,000

IN STORE AT MONTREAL AUG. 15.

	1869.	1870.
Flour, barrels	53,000	121,000
Wheat, bushels	161,000	491,000

It may be fairly assumed, therefore, that more than one million bushels of the wheat which went into Canada in four weeks should have come to Buffalo or Oswego, and would have done so but for the crippled state of our shipping. Our canals and railways have lost the transportation charges, our warehouses and banks have been deprived of the legitimate profits which so large a movement ought to bring to them, and our tax-payers must make good the loss of tolls which this diversion must cause the canals. A marked decline in ocean freights which has already taken place in this port, is another result of this change in the movement of breadstuffs, and this in turn, is discouraging vessels from coming here, to be followed, probably, if the war continues, by a greater advance than that which has recently taken place, when our cotton movement begins, thus again absorbing a large proportion of the profits, which the growers would otherwise receive.—*Commercial and Financial Chronicle.*

—The Southern Railroad of France has now completed its network of lines in the Pyrenees. Their total extent is 537 miles, and the total outlay made upon them to the close of 1868 amounted (including interest paid on capital during the construction of the works) to £9,208,122. The expenditure of capital upon the lines in 1869 amounted to £521,312. The total amount of capital guaranteed by the French Government for the construction of the Pyrenean network of the Southern of France is £10,560,000, so that an expenditure of £830,566 may yet be made upon the lines before the guarantee is exhausted.

Accidents on American Railways.

The attention which has recently been given by scientific associations to inventions intended to lessen the risk of accidents to railway trains, demonstrates the practical and theoretical importance of the subject. Comparisons and collations of statistics have so frequently been made as to render the general details quite familiar. Generally speaking, the New England States have reduced the risk nearly to the minimum of European railways. The Middle States occupy a middle position in this respect; and, again, Western routes exhibit the maximum of liability. New York State might be classed with New England, were it not that frequent and fatal accidents on the Erie road have swollen the statistics to mortality. The New York Central, the Hudson River, and Harlem railroads compare favorably with New England routes; while, on the other hand, the Erie has, for three years past, proved most risky to travelers of all American railways. The last report of the State Engineer exhibits the statistics very suggestively:

	Killed.	Injured.
New York Central	0	6
Harlem Railroad	0	0
Hudson River	0	5
New York & New Haven	0	3
Rome & Ogdensburg	0	0
Erie Railway	26	73

By the first five, 11,166,455 passengers have been carried in a single year without a single fatality, and with injury to only fourteen; by the last, 2,192,594, with twenty-six killed and seventy-two injured; and, for two years, taking the six routes, the risk by way of the Erie has been equally heavy. Carr's Rock and Mast Hope have, in fact, become almost historical as scenes of railway horror.

One of the leading causes of American liability has hitherto been constituted by the inferior quality of the rails. In the Welsh iron districts, for example, the worst stuff that can be dignified as iron is universally known as the American rail. This has not been the fault of the iron-master, but has arisen from the almost universal practice of buying the least expensive article that can be produced, on the part of American customers. The iron-masters have neither concealed the inferiority of the product nor the poverty of the process of manufacture, and have generally preferred to produce good work and guarantee it. The inexorable demand for low-priced iron in this country has compelled them to manufacture poor qualities or retreat from the market; and, to this fact, more than any other, have been due the necessity for almost yearly renewal of rails on American roads, and the financial troubles of leading companies.

Rails manufactured for the European markets are, as a rule, warranted for five or seven years, according to traffic—every rail that fails within the guarantee period being renewed at the expense of the manufacturer. On roads where the traffic is moderate, makers guarantee for thirty per cent. additional; while, on roads of heavy traffic, fifty per cent. is demanded. Where, on account of extremely heavy usage, iron rails cannot be guaranteed with safety, it is customary to use steel instead. The introduction of a similar system of guarantee would, therefore, obviate one great cause of disaster by bettering the quality of the iron, and occasioning greater carefulness of manufacture; and, until it is introduced, the maximum of safety on American roads cannot be attained.

The movement in favor of steel rails has, within the past few years, become almost universal on roads of heavy traffic; the production of steel rails in this country having gained considerable headway. For the year 1869, the manufacture was, in round figures:

	TONS.
Bessemer Works, Troy, N. Y.	20,000
Pennsylvania Steel Works, Harrisburg	18,000
Cleveland (Ohio) Rolling Mill Company	15,000
Freedom Iron and Steel Works, Lewisburg, Pa.	15,000
Cambria Iron Company, Johnstown, Pa.	20,000
Total	88,000

The Troy Works had produced, prior to the burning of the mills in October, 1868, over 2,000 tons, and are now manufacturing at the rate of 20,000 tons a year. The second mentioned works have been in operation for four years, at the rate of 12,000 tons, until last year, when the production was increased fifty per cent. The Cleveland mills produced 8,000 tons in 1868, from steel of Lake Superior iron, and are working this year at the rate of 20,000. The Freedom Works have been producing limitedly for several years—say from 8,000 to 10,000 tons; while the Cambria Company, with a capacity for 25,000 tons, completed the mills in the latter part of 1868, and is, this year, running at full capacity. It may be estimated, therefore, that the home production of 1870 will not be less than 100,000 tons. The American steel rail has been fairly tested, and is held by practical men to be not at all inferior to the Welsh product. The New York Central, Erie, and other leading New York routes, have mostly or wholly adopted the steel rail; while, limitedly, the leading Pennsylvania roads have introduced it at all points of heavy traffic. In the general adoption of steel, or rather, in the application of the Bessemer process to railroads, American companies have taken a leading position. It was only last year that the laying of steel rails from Paris to Marseilles, France, was mooted and carried out; eventuating in the consumption of 137,000 tons from the mills of Petin, Gaudet & Co. and La Cruesot; and steel bridges are to be substituted as soon as iron ore suited to the manufacture can be obtained in sufficient quantity. The former company, in 1868, supplied the New York Central with 5,100 tons, being the first to compete with English companies in the American market; and during the past year (1869), the iron-masters of France have supplied over 60,000 tons of the American demand; the English importation of steel rails having triflingly exceeded 125,000 tons. Taken all in all, therefore, the American consumption of steel rails is now at an average of over 300,000 tons per annum, of which rather less than one-third is American produet.

There is still considerable distrust of the Bessemer process in scientific circles. High authorities aver that, where safety is the consideration, Bessemer steel is not reliable, owing to frequency of flaw, incident to the pneumatic process, not likely to be discovered in testing, unless tests are of the most rigidly unerring kind, application of which is tedious and expensive. Obviously, this being the critical objection to the Bessemer product, its application to railways ought to be accompanied with a rigid system of tests, such as was recently described in the *Engineering and Mining Journal*, as in use at the works of John A. Griswold & Co., at Troy.

THE PHILOSOPHY OF FRACTURE

constitutes a topic which has long engaged the attention of practical engineers. Observation supplies the fact that, as a rule, rails always break near the end—very seldom in the middle or near it; and even very superficial observers have not failed to notice that, on many roads, the ends of rails present the appearance of having been subjected to great and repeated concussions. Concussion is more or less severe in ratio to the gape between the ends, if that exists, or any projection of the end of either rail above the general level, occasioned either by defective laying or inequality of wear in the two rails thus jointed. Suppose, for example, that the projection of the corner of the one rail above that of the other be—as observation supplies numerous instances—less than one-thirtieth of the whole thickness of the rail. Passing over the track, in one direction, the concussion on or near the end of the rail is equal to the momentum of the weight resting upon the forward wheel of the engine, in the first place, succeeded by just as many strokes, rapidly repeated, as there are wheels on that side of the train; while, passing in the other direction, the concussion is equal to so many strokes dealt rapidly upon the projecting corner. In the first instance, the stroke is in the nature of a drop, modified by the forward motion of the train; and the rail is struck, not with a full downward momentum, but diagonally, near the end—the angle being more or less acute, according to rapidity of motion, and the blow being equal to the weight of the whole added to the momentum generated by motion. In the second instance, the blow is equal to the momentum of the train added to the weight of the whole, striking against the projecting corner. The liability to fracture is nearly the same in both instances; and—given: the weight of the engine, the number of cars with ascertained weight, the rapidity of motion, the exact height of projection, and the strength of the rail—any engineer of good capacity would be able to calculate how many times the train must be passed over to produce fracture. Yet it is nothing uncommon for rails to be left in this condition for days; thus extending an invitation to accident.

Again, in instances where there is an appreciable interval between the ends of rails, the laying of which is level, there is an almost equal volume of concussion, which, however, is mixed in elements, that is, partly drop, and partly the nature of a blow upon the exposed corner of the rail. In either problem, the conditions given, the deviation of the rail may be calculated with approximate accuracy; and, under all circumstances, there is a certain greater liability of fracture near the end, other things being equal, than anywnere else, owing to the fact that the solidity of the track at the point of jointure can never be equal to that elsewhere where there is no joint. Hence, as a rule, unless there is a great defect of road-bed or definite flaw in the middle of the rail, fracture occurs within two or three feet of the end; and this leads to the enumeration of the

MAIN CAUSES OF ACCIDENT

on American roads. They may be conveniently classed under their appropriate heads, as:

1. Defective rails, that is, rails manufactured of inferior stock, liable to flaws, not sufficiently tested previous to laying, and not guaranteed by the manufacturer. Under this head falls, also, the fault of defective putting down, but too common on American routes and necessarily incident to the contract system.

2. Defective road-bed, that is, road-bed too hastily and imperfectly constructed to fulfil the conditions of good engineering, which is one of the besetting sins of American contractors. Inadequately ballasted, inadequately drained, and, therefore, unsafe, would constitute the three counts of criticism on most American roads, if subjected to the scrutiny of engineering critics, especially as concerns routes west of the Alleghany ridge. Under this head must be included defective bridging and culverting. Blame not the engineer. In most instances he is so hedged about with limitations as to cost as to be practically bound and delivered over to the enemy.

3. Defective training of employees, to which must be referred most collisions, like the Mast Hope disaster and half a dozen others more or less terrible in casualty, that have become historical.

THE NATURAL REMEDIES

are obvious from the nature of the defects. Firstly, by statute companies should be prohibited from laying rails which cannot be guaranteed for from five to seven years, according to traffic. If the traffic is moderate, iron rails will answer and can be guaranteed for the average period. If heavy, steel rails should be put down under similar conditions of guarantee; and it should be made a misdemeanor of heavy penalty for any corporation, or agent or conductor of said corporation to lay unguaranteed rails either of iron or steel. The system once adopted, iron-masters having no interest in the manufacture of inferior rails, would cease to convert the worst qualities of iron into rails; and there is no remedy—corporations having neither bodies to be kicked nor souls to be damned—except in legal statute of this kind. To hold corporate bodies responsible in damages, has been proved by long experience to be fallacious; and, on account of their great pecuniary influence, criminal prosecution of officials will always prove equally ineffective. The remedy must eradicate the poison from the system; and to apply minor remedial agents is to fight yellow Jack with batteries of tomato pills. The reform must begin with the introduction of the English and continental system of guaranteed product. Other considerations are minor, and fail to cut the root of the evil.

Nor is there any doubt of the economy of the guarantee system. As it is, the renewal of rails on many American roads is almost annual. On others, it is estimated as biennial; and rails that last four years are quite exceptional. Under the European system, the renewal, if occurring at all within the specified period, would be at the expense of the manufacturer, which imposes an effectual limitation on the dishonesty of the latter. Space to exhibit statistical induction need not be wasted. The result of calculation and comparison proves conclusively that the European system would lessen the cost of repairs over seventy-five per cent., which, upon comparison of figures, will be found to compensate for the augmented cost of the iron once every two and a half years. In fact, separating the run of a road into periods of five years, the expense to the company of laying down and renewal, taking the two together, would be lessened on the average rather more than forty per cent., by using the best attainable materials in the first place. Short-sighted as the present system is from an economical point of view, what shall be said of it when it is considered that every defective rail put down is put down at the risk of the traveling public; and for what reason is the pitiful villian who deliberately plans to have a train run from the track, possibly for purposes of plunder, more criminal than the railroad company that lays down an accident in the laying down of every rail! His act is isolated, risking the safety of a single train: while the prevalence of the present vicious system endangers the safety of every train, patron and passenger.

THE QUESTION OF ROAD-BED

is less easy of solution, owing to the distances traversed by American railways. In the Eastern and Middle States, construction is amenable to less unfavorable criticism than elsewhere, though less elaborate than in England or on the Continent. In America the problem of the engineer has been to construct, no matter how difficult the route, at the least expense; in Europe, it is as if the engineer had gone out of his way to be expensive. A tunnel is the hobby of the European engineer, and he never neglects an opportunity to build one. From Havre to Paris, for example, along a river route through an even country, tunnel after tunnel of the most expensive sort occurs, when the fact is obvious that most of them could have been avoided, and, in this country, would have been. Bridges over inferior and remote streams are most elaborate structures of solid masonry; while the ballasting of the road-bed is the very climax. The result is the reduction of risk, far under the American standard, and a rarity of accident that would render even a trifling affair a novel sensation for European journals. A European railroad, like an Egyptian pyramid, is as if built for eternity; an American, as if intended to illustrate the force of the adjective, *ephemeral*. In stations, America is equally inferior. In London, Paris and all European cities, railway stations are among the most beautiful and substantial edifices; here, among the most unsightly and temporary-looking.

It is true that American railways traverse larger tracts of country; but, in the West, the surface is generally favorable, while in the East the distances are less; and, in both regions, with good surveys of route, deep cuts, tunnels, and great filling-in may be avoided altogether. On the whole, the objection on the score of distance, is less valid than it appears. The principle in America is to use railways as a means of developing tracts of country, while in Europe the railways pursue, rather than precede, material progress, which may be bad for the country, but is certainly good for the railroads.

As a crystallization of progress, it is a notorious fact that the railroad contractor in this country is both ignorant and unscrupulous. Specifications are either avoided or superficially complied with—the considerations most affecting the contractor being to make the most money out of his job, and yet to give his work sufficient appearance of solidity to insure acceptance. The tendency being to superficial engineering, defects that can be conveniently masked are not removed by good work on good foundation—to which cause, resulting in imperceptible yield of the road-bed under pressure, may be attributed most of those inexplicable fractures of rails and breakages, the causes of which coroners fail to elicit. The needed solidity wanting, the road-bed settles imperceptibly under weight, and a dozen cases for the coroner ensue.

It may be true that capital cannot be procured here to build on the European model. The fact remains, however, that it is better not to construct at all than to construct unsafely; and very few American roads are up to the standard of good engineering. A competent board of inspectors, composed of the best engineers in the country, and appointed by Government, would constitute, perhaps, the best remedy that could be suggested; and the day of a board of the kind indicated is by no means distant. Till then, the contract system, with all its inherent viciousness, will have its own way; till then, accidents will be of frequent happening. In fact, under the present system, accidents are rather incidents than accidents.

THE UNRELIABILITY OF EMPLOYES

is a part of the American system, responsible, in its way, for many disasters—particularly in the way of collision. The standard of special education to the business in this country is depressed far beneath the European standard; and this is true of all departments, from flagmen to engineer, from brakeman to conductor. Inventions looking to the obviation of accident—as the Miller platform, the safety brake, and a hundred other devices—have been inventions to mitigate accident merely; very valuable in lessening casualties, if accidents must occur, but not preventive. The liability to accident results from causes inherent in the American system, and can be obviated only by beginning at the beginning. To argue otherwise; to parade preventives, as many scientific men have done, smacks of quackery—suggests the epithet, humbug. American roads are, on

the average, far better equipped than European. Engines are larger and better constructed; cars are superior in all respects. Signal ropes, universal here, are almost unknown in Europe: the Paris & Calais road, and a single English railway being the only instances of their use; and yet, in England trains are run at a speed seldom attempted here. The Limited mail, London and Edinburg, runs sixty miles an hour inclusive of stoppages, taking water with train in motion, and fifty miles an hour is nothing exceptional for an English train. Yet collisions are unknown. The whole is as regular as clock-work; has all the arbitrariness of military rule; demands the implicit obedience of police system. You may—this; you must not—that; you cannot—the other thing; and to argue is to waste breath and tongue. The traffic is enormous; the number of trains run, extraordinary. There is a point in London where trains average one in three minutes all day, and one in four and a half minutes for the whole twenty-four hours; yet there is no collision, no confusion, no accident. The system is arbitrary; but travel is safe and rapid.

The result is due mostly to the superior reliability of employes on European roads, and is as creditable to European corporations as its absence is disgraceful to American—for, on the average, with less speed, less frequency of train, and great superiority in rolling stock, more than one-third of all accidents on American roads are due to the incompetence or unreliabiltiy of employees. The remedy is to be sought in compelling corporations to employ men, trained by regular apprenticeship of the most rigorous limitations in every department—with the further proviso that the men are to be intelligent enough, to begin with, to be susceptible of thorough training; and until these several indicated reforms in the American railroad system are brought about, it is useless to expend brains in the elaboration of inventions.—"F. G. F." *in Engineering and Mining Journal.*

Liability of Railroad Companies for Injuries to Persons Occurring on Account of Failure to Fence.

The following is the decision of the Wisconsin Supreme Court in the case of Schmidt, an infant, etc., *vs.* the Milwaukee & St. Paul Railway Company (28 Wis., 186). The opinion is by Judge Cole:

The jury must have found, under the instructions of the Court, that the parents of the child were free from fault or negligence in allowing the infant to stray upon the railroad track. For the Court specifically instructed the jury, that if they found from the evidence that the injury to the plaintifi was caused by the neglect of the defendant or its agents, while the parents of the plaintiff were in the exercise of ordinary care in guarding the plaintiff, then they should find for the plaintiff. The same proposition is substantially embraced in other parts of the charge—that if the negligence of the parents, or those whose duty it was to watch the infant, contributed to produce the injury, no recovery could be had. The jury were told that they must consider all the circumstances appearing in the evidence in order to determine whether the parents had exercised ordinary care in guarding the child or not; and this was undoubtedly correct. As was forcibly argued by the counsel for the plaintiff, in determining this question of negligence, the condition of the family, the season of the year, the place of the accident, the probability that it would happen, and all the surrounding facts and circumstances, were proper matters to be considered by the jury; and they must have found from the whole evidence that the parents were free from fault or negligence.

Then, we think the ruling of the Court below correct upon another proposition, which has been very elaborately discussed by counsel, that is, whether an infant of only eighteen months old must be judged by the same rule as an adult, when exposing himself to danger. In denying the motion for a nonsuit, the Court evidently predicated upon the conduct of an infant of that age. But the counsel for the company insists that this is an erroneous view of the law, and that the correct rule upon the subject is, when an infant brings suit for injuries received, that he is bound to show himself free from all negligence or want of proper care, tending to produce injury, the same as an adult. He argues and claims that all plaintiff's suing for such injuries stand upon the same ground, and are subjected to the same rules; and that, so far as the right of recovery is concerned, whatever would be negligence or want of proper care in an adult, is negligence or want of proper care in an infant. We are not prepared to yield our assent to the soundness of such a proposition, even though cases may be found which seem to sustain it. An infant of the age of eighteen months is utterly incapable of exercising any care or discretion in any matter whatever. He is incapable of comprehending the imminent danger of remaining on a railroad track when a train of cars is approaching. He is necessarily incapable of exercising any judgment or forethought, can neither apprehend the danger to which he is exposed, nor take suitable means to protect himself against it. Negligence cannot properly be imputed to him, since he knows nothing of care, or diligence, or danger. And to say that he is bound to the same legal rules in regard to the exercise of care and diligence in avoiding danger, and escaping the consequences of neglect on the part of others, which are applied to persons of full age and capacity, seems to us a most unreasonable doctrine. Reason, principles and the weight of authority, we think, sanction a different rule. Most of these cases where this question is discussed, are cited on the brief of the counsel for the plafntiff; and we are content to refer to the reasonings in those cases upon the point we are considering. They fully vindicate both the soundness and humanity of the doctrine, that negligence cannot be imputed to the conduct of an infant of such tender years as the plaintiff, and that in respect to his acts he is not to be judged by the same rules which are applied to an adult. All that is demanded in such cases is a degree of care or diligence equal to the capacity of the child. In addition to the authorities cited by counsel upon this point see Whirley *vs.* Whiteman, 1 Head, (Tenn.,) 610, and Angell on highways, §347. And this brings us to the point in the case which presents the greatest difficulty.

The child was, in the month of August, 1865, run over by a gravel train of the defendant, and lost his right arm in consequence of the injury he received. The railroad track ran across the farm of the plaintiff's father, some forty and forty-five rods from the dwelling house. The road had been in operation a year or more, but the company had neglected to construct any fences along the line of the road at that point. The child was on the track where a path leading from one part of his father's farm to the other crossed the railroad.

The plaintiff requested the court to give a number of special instructions, the fourth, fifth and sixth of which were as follows:

"Fourth. The defendant was guilty of negligence in failing to fence its road across the land in question.

"Fifth. If the jury find from the evidence that the want of a fence was the cause of the injury, without negligence of plaintiff's parents contributing thereto, they must find for the plaintiff.

"Sixth. If the jury find from the evidence that owing to the want of a fence, this part of the road over the land in question was unsafe, and accidents more liable to occur there than where the road was fenced, and that the company had notice of the fact, then it was the duty of the defendant to use more than ordinary care and diligence to prevent such accidents, and to run their trains with reference to this consideration."

These instructions the court gave, under exceptions, and also gave, at the request of the defendant, this instruction:

"That the plaintiff cannot recover for the negligence of the defendant in not building said fence, unless you find that the injury happened without the fault of the plaintiff and in consequence of the neglect to build the fence, and that the fence would have prevented it."

Now considering these various instructions together, so far as they bear from the question of liability of the company arising from the fact that it had neglected to build a fence along the road at that place, they simply amount to this proposition: That though the defendant was guilty of negligence in failing to fence its road across the land in question, yet this fact would not authorize a recovery, unless the injury happened without the fault of the plaintiff's parents contributing thereto, and in consequence of the neglect to build the fence would have prevented the accident.

Assuming, then, these facts to exist, as we must after the verdict—that the parents exercised ordinary care in protecting the child; that the company neglected to build a fence along its road at that place, as the law required; and that the child was injured in consequence of this neglect, the question arises. In such a case is not the company liable? The counsel for the company says that the failure to build a fence subjected the defendant to certain liabilities in case of an injury to cattle, horses, or other domestic animals; and that in case of injury to passengers happening in consequence of not fencing the road, certain other liabilities would attach; but that fences were never intended to keep men, women, or children off the track, and are utterly useless for any such purpose.

In answer to this argument, it must in the first place be remembered, that the statute imposes upon all railroad companies of this State the positive duty of erecting and maintaining good and sufficient fences on both sides of their roads, with gates or bars therein, and farm crossings for the use of the proprietors of the adjoining lands. This is a clear, distinct and precise legal duty imposed by the Legislature; and the failure to perform it by the company in this case was the sole cause of the injury. For the jury in effect found, that a fence would have prevented the accident. The facts in this case show, that for more than a year the company had run its trains over the road, neglecting all the while to build a fence at that place—omitting to do what not only the law required, but common prudence demanded should be done, as well for the protection of persons traveling on its road as for the security of the domestic animals of those residing along the track, and the safety of children exposed to its dangers, who were incapable of taking care of themselves.

Now, when the company neglects to perform this duty, did it not necessarily assume responsibility for all damages which might result from that cause? Can the Court make an exception to this general liability, when an infant is injured solely in consequence of the want of a fence, no negligence of the parents contributing thereto? Would it not be an unwarrantable restriction of the statute, to hold that the duty imposed upon the company of maintaining a fence along its road had no reference to such children? If one were to look at the mere verbiage of the last part of the first section (chapter 268, Laws of 1860), he might conclude that the object of the law was solely for the protection of domestic animals. And yet the Courts have held that the law has a broader application, being in the nature of a police regulation, intended mainly to secure the safety of passengers upon railroad cars. Blair *vs.* The Milwaukee & Prairie du Chien Railroad Company, 20 Wis., 254, and cases there cited. Hence, where a passenger, without fault on his part, is injured in consequence of the cars being thrown from the track by cattle passing on to the same at a place where the company ought to maintain a fence, he can recover for all damages sustained, without other proof of the negligence of the company. And this recovery is had in such a case upon the ground that when the company neglects to perform a duty imposed by the statute it "necessarily assumes responsibility for all damages which may ensue from that cause." Thus a liberal construction has already been placed upon the statute for the purpose of furthering the important and beneficial objects of its enactment. It has been extended to cases which, if not clearly within the letter, are certainly within the spirit of the law, as when applied to the case of a passenger injured in consequence of a failure of the company to fence its road. And it is in strict harmony with the principle and reasoning of these cases to say that the statute also embraces a case like the one before us.

Here, if the fence had been erected, the accident would not have happened. Solely and entirely from the omission of the company to perform this clear, positive, absolute duty, the plaintiff is maimed and deprived of his right arm. Had it been an ox or horse, or some other domestic animal, which had been injured by the failure to erect the fence, the liability of the company would be clear and absolute, regardless of the question whether the owner had been guilty of negligence. Can it be, then, a perversion of the intent of the statute to hold the company liable for a breach of the same duty, when a helpless infant is injured without any fault on the part of the parents? It appears to us not. In Wakefield *vs.* Conn. and Pass. R. R. Co., 37 Vt., 330, where a statute required the bell on locomotive engines to be rung, or the whistle blown, for a certain distance at crossings, the Court held that this duty was imposed upon railroad companies, not only in reference to persons approaching or in the act of crossing the track, but in reference to all persons who, being lawfully at or in the vicinity of the crossing, might be subjected to accident and injury by the passing train. In that case the plaintiff had crossed the track, and driven about 35 rods south, when a train of freight cars came over the road from the south, and was within five or six rods from the plaintiff's team when first discovered by him and his horses. The forward pair of horses, being greatly frightened, instantly turned back with such force as to break their fastenings to the other horse, and ran back to the crossing, where they were injured by the passing cars. The Court, while holding that the connection of the failure to blow the whistle or ring the bell with what did happen seemed very slight, yet could not for that reason say that the company was not responsible for any injury caused by an unwarrantable omission to perform the duty imposed by law.

In Singleton *vs.* The Eastern Counties R. R. Co., 97 Eng. C. Law, 287, it seems to be assumed by the judges, that if the children have strayed upon the railroad track through the fence, at a place where a rail was off, which fence the company was bound to keep in repair, this would be such an act of negligence as would render the company liable. Mr. Justice Williams says: "There was nothing to show how the children got on the railway; all was mere conjecture and surmise." But the fair inference from the case is, that if it had appeared that the child passed on to the track through a defective fence which the company was bound to keep in repair then the action might have been maintained. In this case, the connection between the omission of the company to perform its duty, and the accident which happened, is direct, clear and certain. If the company had built a fence at that place, the child would not have been injured. So the jury must have found, under these instructions. Upon such a state of facts, we are unable to say that the company is not liable for the damage sustained.

The sixth instruction, above cited, calls for no special remarks. We think it substantially correct.

It was further insisted that the judgment should be reversed because the damages are excessive. The jury gave a verdict of $8,000. It is, of course, difficult for any one to estimate the real amount of damages which the child has sustained in consequence of the loss of his arm. The question was one peculiarly proper for the jury to determine. We cannot interfere, unless the excess is so great that we can say that the jury must have acted from some improper influence or bias in the matter. This we cannot say.

There are many other points discussed in the arguments of counsel, but we do not deem it necessary to notice them. The questions which we have noticed are the controlling ones, and dispose of the cause.

The judgment of the County Court is affirmed.

Steam Locomotion in Cities.

BY J. K. FISHER.

About the time of the opening of the underground railway in London, Mr. Peter W. Barlow, C. E., in a paper read before the Institution of Civil Engineers, proposed a tunnel railway, in which the cars were to be thrown like shuttles from station to station, three quarters of a mile apart. The stations were to be on summits, so that the descent would help to start the car, and the ascent help to stop it; so that a high speed being acquired at the start, and kept until the stop, the mean speed would be much higher than is possible for locomotives. He had not worked out a plan of starting machinery; but his idea was that by stationary power, in going 300 feet, a speed sufficient to run three-quarters of a mile could be given. If the summit be 30¼ feet above the level of the line, a car will attain a speed of 30 miles an hour in descending, and equal speed will be extinguished in ascending—friction being overcome by the additional power given by the starting engines. If the stations be four times as high, the speed will be double.

For Broadway (New York) I should propose to run under the rears of the lots midway between Broadway and Mercer and other streets. The stations should be as nearly as practicable on a level wtth the street, so that passengers should not have to climb stairs. And the summit inclines should be as steep as the hills of common roads, say 1 in 8, so that high speed could be quickly got, and kept until close to the next station. The depth of the line level below the summits should be such that the tunnel would go under all the sewers, pipes, sub-cellars and other structures. The only land damages would then be in the blocks in which the stations were. There would be an entrance to each station, occupying the width of a store; but counters for the sale of papers and small goods could be made on one side, and let profitably. The station room in the rear would occupy the whole length of a block, if trains were used; but if cars were run singly, less room would suffice. A steam engine at the foot of each incline, working an endless

chain, would, with the help of gravitation, start a car at a speed of 50 or 60 miles an hour, or at such speed that it would arrive at the next summit at 4 or 6 miles an hour, when it would be stopped by breaks without much wear and tear. The boiler should have ample steam and water room, so that the intermittent work would not cause too much fluctuation of pressure.

The tunnel should be large, so that the resistance of the air may not be excessive; and the cars should be smooth-sided and round-ended, to lessen the resistance of the air. Mr. P. W. Barlow, Jr., is carrying out this plan in a subway under the Thames, but I think he will not get much speed in it, because his tunnel is so narrow that the air will be compressed in front and rarefied behind, and there will be great resistance. As boats cannot run fast in shallow water and canals, so cars cannot run fast in narrow tunnels. This, I presume, was the reason for the enlargement of some of the tunnels of the Metropolitan Railway in London.

Barlow claims that he will save much wear of rail by avoiding the use of locomotives. It is generally estimated that a locomotive damages the rails as much as twice its weight of carriages. If this be true, the 45-ton engines must wear more than the 80-ton trains on the Metropolitan Railway, and Barlow would save more than half the wear.

It occurs to me that a further saving can be made by oiling the rails, so that the flange-and-cone friction will be reduced to a third, or 3⅓ instead of 10 lbs. per ton, at a speed of 30 miles per hour. This is practicable with Barlow's plan, in a tunnel which is kept free from gritty dust. But a still further diminution of resistance may be attained by making the wheel-treads cylindrical, and depending on the flanges to keep the cars on the rails. Sir Charles Fox has tried this on a railway 250 miles long, and has found that the cars run with less jolting, and curve better, than when the wheels are coned. The continued use of the cone is due to a superstitious reliance on the opinions and practice of George Stephenson, who was not one of the best mechanical engineers of his day, and many of whose ideas have not been confirmed by the tests that have been applied since his time.

On the Broadway line, with Barlow's plan, there is no necessity for long curves, or for any curves at all. Switches at the termini may be dispensed with by using side shifting-tracks. There is, therefore not even an imaginary reason for coned wheels. And as the accommodation of cars of common railways should not be an object on a city railway, the cone and the inclined rail-top should be got rid of, and a broad, level rail, like a floor-beam, should be used. Five inches width of top, with proportionate strength, so that each wheel could bear double the load now carried, and four-wheel instead of eight-wheel cars could be used would be the best for a city line. And on such a line there would be no cone friction, and the flange friction would be slight if the flanges were well oiled.

These ideas of broad, flat-top rails and cylindrical wheels, and chain traction for 200 or 300 feet, are partly my own and have some sanction from practice but are not yet worked into such shape that I am willing to place full confidence in them. But this I do not hesitate to say, that the common rail and common wheel will not work well for such a line as is required for Broadway. At high speed their resistance is from two to three times greater than it was believed to be for years after railways were established. It is 10 lbs. per ton at 30 miles per hour, and from 23 to 27 lbs. at 80 mile per hour. Now on stone tracks a steam carriage with cylindrical wheels at those speeds would not have near so much resistance. There is a great amount of sliding incident to the cones; and the bearing on the rail being narrow, there is a rapid abrasion of rails and wheels, and a loss of power equal to the work necessary to produce this abrasion.

In a paper which I read some years ago before the Polytechnic Association of the American Institute, and which was published in the *American Artisan*, I showed that 16 miles per hour average speed could easily be attained on this plan; and I think a greater speed practicable. But with such frequent stops a very high average speed is impossible. Compared with the plan of the Metropolitan Railway, this of Barlow's, if well worked out, may give one-half more speed, and that is enough to entitle it to preference. But there are other points in its favor. It allows as good a ventilation as we can have in a building. And it is safer than the locomotive plan; what would be the fate of passengers if even a partial rupture of the boiler were to occur in the middle of a tunnel a mile long? I believe they would be suffocated if the train were stopped.

Lastly, this plan allows a complete protection of the track from atmospheric influences; no rain or snow can enter the tunnel or stations, and the air may be kept at a constant temperature all the year, so that the rails will not expand or contract, and may be made with few joints, and those joints closely fitted. But the Arcade and steam tunnel plans require such a vast influx of air to keep them from suffocating passengers that the usual effects of expansion and contraction will occur in them —not so much as in the open air, but enough to impair their durability to an extent that will lessen dividends. —*American Artisan.*

French Transatlantic Cable.

The report of the directors states that the special general meeting to be held on the 9th of August has been called for the purpose of declaring an interim dividend for the six months ending June 30, 1870, and for obtaining the sanction of the shareholders to such alterations in the statutes of the company as will enable the directors to declare half-yearly or quarterly interim dividends, and facilitate the convocation of general meetings. Since the last meeting, held in Paris on the 21st of February last, the traffic has been good. The proportion of this company has averaged over £3,000 a-week, which enables the directors to recommend the payment of an interim dividend for the six months ending June 30 of 14s. per share, being at the rate of 7 per cent. per annum. In accordance with the vote of the shareholders at the last meeting, empowering the directors to take all necessary steps to bring the agreement of the 15th of January, 1870, into operation, an arrangement has been concluded with the French Government by which the preference of all traffic at equal rates is guaranteed to the company on the relinquishment of the special concessions for landing cables in France. This and the passing of the Atlantic Bill have enabled the directors to conclude a very advantageous agreement with the Western Union Telegraph Company of New York, so that the joint companies now possess the preference at equal rates of all messages passing through England and France, and an exclusive working arrangement with the most powerful land telegraph company in America. By a second agreement with the Anglo Company, 34-64ths of the maintenance steamer Robert Lowe has been purchased by them, thus enabling the company to save at once more than half of the sum set aside for her construction, and reducing the cost of her maintenance to less than half. In May an interruption occurred in the St. Pierre-Duxbury section of the cable off Cape Sable. As it is in shoal water no difficulty is apprehended in picking up and splicing it, and the maintenance ship is now on her way to do this. Owing to the arrangement with the Anglo Company no interruption is caused in the traffic by this accident, nor any diminution of revenue, the Brest-St. Pierre section being joined to that company's Placentia cable.

How a Railroad Three Miles Long Earned Half a Million.

We see by the Texas papers that the Legislature of that State has granted to the Memphis, El Paso & Pacific Railroad Company a right of way across the public lands of the State. This is the company which has in prospect the construction of a road across the northern tier of counties of Texas, to connect with other roads in Arkansas on one side, and Arizona on the other, so as to form a through line, to be called the Southern Pacific Railroad. It has been under the control of Gen. Fremont and his associates, and is the same company which has recently been seeking aid from Congress. It has had some singular fortunes and misfortunes.

The original charter of the company was granted by the State of Texas in 1858, with a right to construct a railroad through the northern tier of counties of that State. A supplementwas passed in 1861, granting some further privileges. By the charter and supplement, together, the company are guaranteed a large amount of State lands on the completion of every ten mile section of the road—we believe it is equivalent to twenty miles in width on each side of the road. The original corporators and directors never effected anything; indeed the war prevented anything being done. But in 1866, Gen. Fremont and his associates took the whole thing upon contract, on consideration of having control of the entire stock and advantages of the charter, stipulating that the Directors should co-operate by passing the necessary resolutions and executing the necessary bonds to operate with. Under this arrangement a large quantity of road bed construction bonds were issued to the amount, we believe, of $16,000 per mile, and ten million dollars of land grant bonds. Five millions of the latter were secured upon the State lands, which would be due on the completion of the first 150 miles of the road; and the other five millions upon the next 150 miles. The bonds were placed in the hands of the contractors, Fremont and his associates. They had been made members of the board, and Fremont and two others were appointed the Executive Committee, with full power to act in place of the Board.

The wonderful thing is, that without any property except in the moon, without having scarcely put a spade in the ground, this committee succeeded not only in getting their bonds admitted to the Paris Bourse, but actually disposed of $5,000,000 of the land grant bonds at sixty cents on the dollar in specie—equivalent to about eighty-four cents in currency—thus actually realizing about $4,200,000 in cash.

The means resorted to for raising this money, and the disposition of it after it was raised, have been made the subject of a serious litigation, involving the possession of the charter and what remnants remain of the corporate property. In February last a suit was commenced against General Fremont, James M. Daniel (the Chief Engineer) and others in New York city on allegations of fraudulent conduct, and an order for their arrest was made.

But they turned up in Washington and were not arrested. They had an office in New York, however, and left many securities and considerable property behind them. John A. C. Gray was appointed receiver, and took possession ot the assets.

Recently application has been made to Justice Bradley, as Judge of the United States Circuit Court for the Western District of Texas, for an injunction against the company in its corporate capacity, and the appointment of a general receiver of all the property and assets in Texas and elsewhere. This application was made by C. Parker, Esq., of Newark, on behalf of the Trustees of the land grant mortgages (who are P. F. Forbes, of Paris; S. M. Swenson, of New York, and Andrew G. Curtin, of Pennsylvania), and of Emanuel Lissignol, a Paris broker, who holds some of the bonds, and of Fred. A. Lyon, of Illinois, who holds some stock. These plaintiffs file a bill in equity, and charge that it was a breach of trust in the directors to place the whole control and disposal of the corporation and its chartered privileges in the hands of these men; that the means resorted to by these men to palm off the bonds in Paris were a downright fraud; and that the money raised thereby has been squandered and embezzled by the parties and their agents, so that the railroad corporation and corporate property will derive scarcely any benefit from it.

The fraudulent means particularly specified were the publication of a pamphlet in Paris, in the French language, in the summer of 1869, in which it was represented that a large portion of the road was built; that the right to State lands had become vested to the amount of eight millions of acres, worth $14 per acre; that connections had been secured to the Pacific in one direction, and to Richmond, Va., in the other; that the Congress of the United States had passed an act in March, 1869, guaranteeing the payment of six per cent. interest on the company's construction bonds to an amount of $30,000 on each side of the road, and the payment of the principal at maturity; the proceeds of which were to be expended in building the road, and that the bonds were good, though all the lands should revert to the State! The bill charges that all these representations were simply false.

As to the disposition of the proceeds of the bonds, they allege that Fremont received 16 per cent., or about half a million of dollars for commissions; that when interest became due on the bonds, they paid it out of the sale of more bonds, so as to keep up a fictitious credit; that large sums were paid to persons of influence and position to get the bonds on the Bourse; that Fremont's brother-in-law, Gauldrie Boileau, Consul General of France, in New York, received 248 bonds of $1,000 each, and returned them and was paid for them out of the proceeds of bonds sold in Paris: that although about 6,000 tons of iron rails were purchased they never were used, except to lay about three miles of road in Texas, the only portion of the road ever built; and that the rest lie in the Custom House at New Orleans for nonpayment of freight and duties. They allege that in December, 1869, the parties laid out $250,000 for stock in the Memphis & Little Rock Railroad Company; $100,000 to purchase stock in the San Diego & Gila Railroad Company, and Arizona Railroad Company, and they had laid out $450,000 to pay interest on bonds; $480,000 for iron rails and machinery in Europe; that $300,000 was still in their hands; and that the balance of $2,400,000 went for commissions and to pay pretended claims of the parties, their agents, &c. The result and conclusion of the whole matter, as stated in the bill, were that the money was nearly all spent, and nothing had been done to secure the lands which constituted the only basis and security of the land grant bonds. And, in addition to these bonds, the parties had also issued land certificates of $1,000 each, to an unknown amount, and distributed them to their friends in Congress and elsewhere.

The bill does not stop here, but alleges that in November, 1867, a sub-contract was made with one William Schmoele, of Philadelphia, for constructing the road. By this contract, the whole $40,000,000 of the capital stock was subscribed, viz: $30,000,000 by Schmoele, and $10,000,000 by Epperson the President of the Company and associate of Fremont. The latter was to be considered full paid stock, and to be received for services, salaries, etc. as fast, in proportion, as the road should be finished. Also, ten millions of the thirty millions subscribed by Schmoele, was to be considered full paid stock in his hands in the same manner. The other $20,000,000 to be sold—at not less than 75 cents to the dollar; and the building of the road to be paid for out of the proceeds of such sales, and out of the sale of State lands, and any other subsidies received from Government or from Texas. Ten per cent. of the gross proceeds of all sales of stock, &c., to be allowed Schmoele for commissions; and expenses and commissions not to exceed 25 per cent. In June, 1868, a contract was made between Schmoele and Fremont, by which the latter was to be equally interested with the former throughout.

The allegations of the bill being strongly supported by affidavits, and notice being acknowledged by the attorney of the company, as well as by General Fremont, Judge Bradley granted the injunction and appointed a receiver as requested. He appointed John A. C. Gray as the receiver, and required him to give bonds in the sum of $50,000.

The above facts have been gleaned in good measure from an inspection of the proceedings, which were ordered to be filed in the United States Clerk's office at Tyler, in Texas, where they now are.

Meantime, we understand that Mr. Parker, the counsel, and Mr. Gray, the receiver, have gone to Paris, probably with a view to a conference with the bondholders. Under this state of affairs it may be a problem worthy, though difficult, of solution, in whose interest the recent legislation in Texas is being made, whether in the interest of the original company, which is now represented, it seems, by Schmoele, Fremont and Epperson, or in that of the Paris bondholders, who so freely took the bait, and advanced three millions of dollars in specie on the representations made in a paper prospectus.—*Newark Advertiser.*

—It is stated that a number of conductors on the different roads in the State hold commissions from the Governor, investing them with all the powers of policemen, to make arrests and quell disturbances when necessity requires. This will be a notable improvement to the comfort and convenience of the respectable portion of the traveling public, and will tend to suppress a number of petty annoyances to which passengers are at times subjected. Any refractory or turbulent rough or loafer can immediately be placed under arrest and disposed of at the stations along the road. The confidence men, too, will find their occupation gone, and will have to seek new fields of enterprise to exhibit their deft skill, and unsurpassable impudence. This system should govern all roads throughout the country.—*Albany Journal.*

—The South Italian Railroad Company has signed a convention with the Government of the Khe-dive of Egypt, by virtue of which a new service of steamers will be established between Brindisi and Alexandria and between Brindisi and Constantinople. Four large vessels will be put on the line from Brindisi to Alexandria and four others on that from Brindisi to Constantinople.

The Artisan in France, Belgium and Holland.

In France, the working life of the artisan begins betimes, the law recognizing the child of eight to be fit for eight hours' labor in the factory or work-shop; and when he is four years older considers him capable of working 12 hours out of the twenty-four. Before a child can thus be turned to profitable account; it must be proved that he has received primary elementary instruction, or that he attends a school in the neighborhood of the shop. Apprentices cannot be taken by any one who is under age, or who has been found guilty of an offense against public morality. The master, or *patron* as he is called now-a-days, is bound to thoroughly instruct the apprentice in his calling, to watch over his conduct like a father, see that he is not employed in any work beyond his strength, or in itself unhealthy; and if he is not fairly proficient in the three *Rs*, or his primary religious education has been neglected, must allow him two hours every day to make good his deficiency. Apprenticeships are commonly of five or six years duration; but when a premium is paid, a couple of years less suffices. As soon as the apprentice becomes a journeyman, he must obtain from the authorities a *livret*, or note-book, inscribed with his name, age, trade, and description. In this book he has to enter all his engagements, the date of their commencement and close, advances made by employers, and keep an account of all his debts and movements. The livret—soon to be abolished—is a great grievance with the French artisan, although it is after all a sham, the regulations being evaded by common consent of all concerned. Most engagements are made verbally, and in Paris a week's notice terminates them, whether they are made for a week, fortnight, or month. In most factories the men are fined for leaving the shop during working hours, for introducing strangers, or for eating, drinking, smoking, singing, or gossipping on the premises; the fines being applied to some purpose for the benefit of the workmen or those belonging to them. A workman can be summarily dismissed for disobedience, incompetence, idling, causing disturbances in the shop, or treating his employer or his employer's family with disrespect. On the other hand, he can throw up his work if put in an unhealthy shop, if deprived of his meal or rest time, if he has work given him not stipulated in his engagement, or if he is struck or otherwise insulted by his patron.

Fine and imprisonment await any one seducing workmen to pass into foreign employment. Any one communicating the secrets of a factory in which he is employed, is liable to a fine of from sixteen to two hundred francs, with imprisonment of from three months to two years; but if the offense is committed for the benefit of foreigners or Frenchmen residing abroad, both fine and imprisonment are heavier—the former ranging from five hundred to twenty thousand francs, and the latter from two to five years. Strikes do not seem to be actually illegal, but the penal code declares that whoever, by the aid of violence, blows, menace, or fraudulent manœuvers, shall bring about, or attempt to bring about, a cessation of work, with the object of forcing a rise or fall in wages, or infringe the free exercise of industry, shall be punishable by from six days to three years' imprisonment, and a fine of from sixteen to three thousand francs; and that workmen, employers, and contractors who, by means of fines, prohibitions, restrictions, or interdictions resulting from a concerted plan, shall infringe the free right of labor, shall be fined to the same extent, and be imprisoned for from six days to three months.

As a rule, twelve hours make a working-day in France, out of which one hour is allowed for breakfast, and another for dinner. In some trades the men are paid by the hour; but payment by the day is most general, although the piece-work system gains ground every day. In Paris and the towns, six days go to the week; but in the provinces, where wages are lower, they reckon seven, but give the Sunday to the workman. Of course, in all trades, the earnings of an individual depend somewhat upon his industry, skill and quickness. Taking a fair average, however, we may reckon the weekly earnings of the Parisian artisan at the following rates: Plasterers make $5.50; wheel-rights from $5.50 to $7.50; coopers, $6.00; masons, $6.50; shoemakers, $6.00; to $6.25; tailors, $4.75 to $7.25; painters, farriers, jewelers, and carpenters, $7.25; weavers, $7.25 to $8.25; stone-cutters, $6.70 to $9,50; blacksmiths, $6.50 to $9.50; printers, $7.25 to $9.50; and cabinetmakers, $6.50 to $12.00 a week. Ordinary hatters earn from $4.75 to $5.50; while a good "finisher" may make nearly $15; but he does not do it. He works piece-work, and makes up his week after the following fashion: On Monday he will not work at all; on Tuesday, he earns a frank; on Wednesday, two; on Thursday, four; on Friday, five; while on Saturday, which is pay-day, he will make fifteen francs. Parisian wages certainly fall below the English standard; a London carpenter, for example, receives twelve shillings more for his weeks work than his French brother. Woman's work, in Paris, as everywhere else, is shockingly remunerated; and while wages have generally risen in the last twenty years, there has been no advance where women are the sole workers. The industrious fingers of the French seamstress, let them work their hardest, will not bring her more than $3.00 a week—an amount representing the average income of the flower-maker, stay-maker, washerwoman, and ironer, although they do manage sometimes to get another half dollar. At dress-making, sewers get $2.75, cutters, $3.50 a week, the head workwoman receiving perhaps $20.00 a month; while milliners are boarded and paid from $80 to $240 a year. A female weaver cannot earn more than $2.50 a week, and many of them have to be contented with weekly wages of $1.25.

A workman can board very well in Paris at the rate of three francs a day or something less than $4.25 a week. Under the imperial regime, whole quarters of the capital wherein the blouses loved to congregate have been swept away, and they have been driven into the suburbs, which can only be reached at an expenditure either of their time or their money—as it is, they have to pay $20 a year for a single room without a fire-place. It is true, model lodging-houses have been built by the benevolent and the speculative, but those for whose benefit they are intended do not take at all kindly to them. The artisan's pride revolts at anything savoring of pauperism, therefore he shuns the habitations erected by the charitable; and while he acknowledges the superior arrangements of the *cites* built for him, he prefers freedom to comfort. He has enough of discipline, of rules and regulations, at the workshop, and objects to being trammeled by them outside its gates, and declines to take up his abode in a *cite*, on the ground that he chooses to be master in his own home.

There is no want of institutions for benefiting the artisan. There are *creches*, where children in arms are taken care of, while their mothers are working, at a charge of twopence a day; there are *salles d' asile* where children of tender age receive instruction in fifteen-minute lessons; there are *ecoles primaires*, where older ones are taught reading, writing, arithmetic, grammar, geography, physical science, mathematics, and surveying—the two last named institutions being free everywhere to children whose parents are too poor to pay, and free altogether in the capital. At Chalons, Aix, and Angiers are government schools intended to rear good foremen, where theoretical practical instruction in various trades are given; and most manufacturing districts have their technical schools, to which the workmen flock with avidity. Then there are savings banks, taking deposits of a franc, and allowing compound interest—every sum of twelve francs having the interest (in 1867, it was three-and-a-quarter per cent) added to it every month. In 1867, there were 1,845,603 accounts held by these banks, giving an average of one depositor for every twenty inhabitants, and an average deposit of £12, 7s. 5½d.; thirty-three per cent. of the investors were bona-fide workmen, thirteen per cent. servants, and four per cent. soldiers and sailors. By investing one penny for every working-day in an annuity society, the artisan can insure twenty pounds a year upon reaching the age of sixty; and to have assistance in time of sickness, and burial expenses paid, he has but to join a *societe de secours mutuels*, the president of which is named by the Emperor, and the managing committee by the members themselves.

While acknowledging that in the course of a generation wages have increased no more than twenty-three per cent., while lodging has become dearer, and food risen fifty per cent., the French Official Report asserts that the condition of the artisan has much improved. He pays less for clothing and furniture; savings' banks have taught him the use of economy: his eyes are open to the folly of early marriage; and intemperance swallows less of his earnings. "Vast promenades, where art has brought together everything that can amuse and enchant, are by degrees drawing the artisan away from the unwholesome tavern haunts, to bring him and his family to green swards, beneath beautiful trees, beside clear waters, and exciting in him that sentiment for art which beautiful and useful works always create!"

The Belgian may be a better subject, but as a workman he is not to be compared to his lively neighbor. His *forte* lies in producing a cheap article, not a good one, and he gets paid accordingly. In domestic trades, such as carpentering, tailoring, and the like, the careful workman is his own master, renting a small house, with a little shop for his wife, of which he lets off as much as he can spare. Such a man will earn from $1.00 to $1.50 per day; while the young and improvident artisan, who works far others as a journeyman, thinks himself lucky if he gets fifty cents. He, however, never dreams of working upon Mondays or *fete* days, and relies upon public or private charity to help him to exist; which he contrives to do upon potatoes, vegetable soups, weak coffee, inferior bread, and very little meat. This class are equally badly housed; "they herd together in the most dismal streets of the great cities, or crowd the damp hovels which surround the country towns and the pit mouth; their dwellings are as fine fields for epidemics as it is possible to conceive, as they are seldom able to afford more than one room, to which a lodger is frequently admitted, and the moral taint of overcrowding falls heavily upon them."

Miners, colliers, engineers, and workers in copper, iron, and glass, are better paid, better fed, better clothed and better lodged. Barring the miners, these are a steadier class of men, living generally in the upper parts of respectable business premises in the suburbs. Most of them can read and calculate tolerably well, but despite these advantages, are hardly as well informed as the same class of English workmen. As to earnings, colliers get from eighty-four cents to $1.00 a day; engine drivers, from $1.25 to $2.00, with extras for fuel saving; mining engineers and overlookers receive about $400 a year; and workers in factories are paid from sixty-two cents to $2.00 a day; females, however, cannot make more than thirty-six cents. The mode of payment is commoniy by the quarter-day of two hours; the workman dismissing himself, or being dismissed without notice, contracts between master and man being very rare in Belgium, while apprenticeships are unknown. Like the Frenchman, the Belgian has his Council de Prudhommes to settle trade disputes cheaply and expeditiously, his friendly societies, and his annuity societies. Trades' unions exist, but have little influence, except in the coal and mining districts.

It is not a far cry from Belgium to Holland, but the difference between the people of the once united lands is something extraordinary. While, as a rule the Belgian artisan is careless, indifferent, and thriftless, the Hollander is painstaking, industrious and economical, deeming it almost criminal to spend all he earns. With necessaries as dear, luxurics far dearer, and wages much lower than they are here, a Dutchman manages to have a healthier family and a happier home than the majority of English workmen can boast. A skilled artisan can hardly earn, even in the larger towns of Holland, more than $4.00 a week, which he can possibly make into $4.50 by odd jobs after working hours, and into $5.50 if his wife takes in washing. In small towns he must be content with $2.50. In summer, he will work twelve hours, having half an hour allowed him for his breakfast, the same for his tea, and an hour or an hour and a half, for his dinner, and a smoke after it. He breakfasts on coffee with sugar and milk, and a sandwich composed of two slices of white or brown bread and butter, inclosing a thinner slice of highly-flavored black bread; he teas on the same; while his dinner consists of potatoes, followed by a mess of vegetables boiled in fat, fish, and a cup of tea. If he can, he goes home to dinner; if he cannot do that, he cooks his dinner at the workshop, or else repairs to an eating-house, where he can satisfy his hunger upon vegetable diet for the charge of four cents.

Meat does not come with the Dutchman's bill of fare; if he indulges in it at all, it is on Sunday, and at home with his wife and children. The Dutch artisan is well clothed and admirably housed. He must have a house, let it be as small as it may, to himself, and in every town his wants are studied. Here is a description of a modern block of workmen's houses in Holland:

"Passing down a street, one notices here and there a narrow passage about four feet wide, which at first sight might be taken for a back way to one of the adjoining houses. But entering by this narrow passage, one finds one's self between a double row of neat brick houses, inclosing a garden, divided off by low hedges or palings into a number of small plots, three or four paces square each one belonging to the house opposite to it. There may be a dozen houses on each side, all precisely alike, and forming a single property. A common pump is somewhere to be seen, probably in the centre of the inclosure. The garden-plots serve as drying grounds for the clothes of the family, or for the pots and pans which are being continually cleaned, and in which the Dutch housewife takes so much pride. On entering one of the houses, one stands in the middle of a room about fifteen feet square, provided with a single window in front; a chimney in one of the side walls is fitted with a small stove, the property of the tenant, which sufficiently answers the purposes of heating cookery. In another wall are one or two cupboards, the crockery closet and pantry of the establishment; while a larger recess fitted with a bed, and concealed by a curtain, forms the sleeping place of the parents of the family. The floor is generally boarded; the walls, about eight or nine feet high, are plastered and whitewashed, unless papered by the tenant. The furniture in the room is generally sufficient for its size, and carefully kept. There is no back door or yard. In a corner of the room is a steep narrow staircase, leading to the room above, where sleep the younger members of the family. There is in one corner of the upper room a closet communicating with the main drain. An air of order and propriety pervades the whole establishment, and gives evidence that neatness and cleanliness are regarded among the first of household virtues."

In a town like the Hague, such houses cost about fifty cents or sixty-two cents a week; in country towns, less. There are, however, numerous dwellings, particularly in Amsterdam and Rotterdam, built before the modern regulations respecting housebuilding came in force, of a very inferior description; but, on the other hand, the newer artisan streets are of a still higher class than those described above more open, more comfortable, and with real gardens. Within the last few years, model lodging-houses have been erected by companies content with five per cent. dividends; these buildings are not huge barracks, but rows of two-storied houses, with double fronts looking into separate gardens. Each cottage is tenanted by two families, one occupying the ground, the other the upper floor, each having their own garden plot. The rent of the ground floor is fifty-two cents per week; that of the upper floor, possessing an attic in the roof, sixty-six cents.

So far as the law is concerned, the Dutch workman has little to complain of, if he was of a complaining nature. He is left to work when he likes and how he likes. There is no law of apprenticeship, because there are no apprentices. A boy wishing to learn a trade gets the necessary tools together, and goes to work at nominal wages, his pay increasing with his capabilities; and the plan answers well enough. Combinations for the purpose of altering wages are, however, sternly forbidden by the penal code; consequently, the only trade associations known in Holland are benefit clubs for giving help in time of need; and somehow trade disputes, when there are any, get settled without much trouble. Once or twice such a thing as a strike has occurred, but it speedily died, from want of sympathy. In truth, nothing save a breach in the dike will move a Dutchman out of the even tenor of his way. The Dutch laborer reflects on the value of his earnings; the energies which a warmer blood and a more impetuous temperament would expend in political excitement, he consecrates to the improvement of his own individual lot; the question of the hour, the news of the day possess little interest for him; he prefers his Bible to his newspaper, and his family fireside to the public house, the reading room, or the political meeting. Jealous to a degree of the liberty he possesses, he does not sigh for more; and prefers enjoying in peace the advantages already secured to him, to agitating for others which his fathers did without. The Dutch artisan is a model of contentment, and probably the happiest of his race.—*Chambers' Journal.*

—The Russian Government have granted to the Black Sea Navigation Company, which will henceforth be carried on under the title of "The Company of Russian Steamships and Odessa Railway," a concession for the Odessa line, comprising extensive ramifications, with an authorized capital of 47,445,000 silver roubles and 30,413,000 paper roubles, the former amount to be issued in guaranteed obligations and the latter in shares. The proposed line will establish the shortest connection between Austria and the Black Sea at Odessa, which is the great grain port of Russia.

General Railroad News.

OLD AND NEW ROADS.

Montpelier & Wells River.

Preliminary surveys have been made for this road which is to extend from Montpelier southeast to the Connecticut River at Wells River. It will complete a connection between the Vermont Central and the Boston, Concord & Montreal roads, with a line about 30 miles long.

Athol & Enfield.

This road is to extend from Athol, a station on the Vermont & Massachusetts Railroad, 33 miles west of Boston, southward about 20 miles. It is progressing satisfactorily, eight contractors being engaged on the road bed.

Utica, Chenango & Cortlandt.

This road is to be extended from its present terminus at Cortlandt so as to make a connection with Elmira. It is now in operation from Cortlandt northeast to Otselio, about 25 miles, and is to be extended northeast as well as southwest to complete the connection between Elmira and Utica.

Spuyten Duyvel & Port Morris.

This is a branch of the Hudson River Railroad just north of Manhattan Island, in Westchester county, to connect with the Harlem Railroad. The contracts require its completion by January 1st, 1870, after which Hudson River passengers will be brought to the great Union Passenger station at Forty-second street and Fourth Avenue now building, thus avoiding the present journey from the Thirtieth street station which must be made at a low speed. The new road passes under High Bridge and the Central Avenue Bridge (at McComb's Dam). It is proposed to have stations at each of the connecting roads now building, which will accommodate travel in the lower portion of Westchester county.

Ithaca & Cayuga.

An effort will be made to construct a railroad from Ithaca northward along the east side of Cayuga Lake to Cayuga, on the line of the New York Central. The distance is about 40 miles, and $1,000,000 is wanted to construct and equip it. $320,000 has been subscribed and a contractor offers to undertake the whole line when $350,000 more is secured.

Union Pacific.

It has been ascertained that this company owns the land on which the city of Cheyenne has been built, and thus is the legal owner of that town. What the people or the railroad company propose to do about it does not yet appear. The Commissioner of the General Land Office warns off settlers from the company's lands in the following circular, dated August 9:

"*Notice is hereby given*, That settlers who go on the "odd numbered sections in Wyoming within twenty "mile limits of the Union Pacific Railroad, granted to "Railroad Company by the acts 1st July, 1862, and 2d "July, 1864, do so at their peril, their right so to settle "not being recognized by this Department."

Middleboro & New Bedford.

A charter has been obtained for a railroad from New Bedford, Mass., due north 18 miles to Middleboro, on the Old Colony & Newport Railroad, thus giving the former place a direct route to Boston.

Old Colony & Newport.

The company has purchased the old Granite Railroad of Quincy, which is said to be the oldest railroad in America. It has always been operated with horses.

Manchester & Parkton.

This new Maryland railroad is partly graded from Parkton, a station on the Northern Central Railway four miles south of the Pennsylvania Railroad and 29 miles from Baltimore, due west to Manchester in Carroll county, about 45 miles. A preliminary survey, looking to the extension of the road three miles to Bachman's Mills, has been made, and the intention seems to be to extend it to that point as rapidly as the means of the company will allow. It is an important point to strike on account of the large beds of iron ore and limestone.

Honduras Interoceanic Railroad.

The *Gazette Official* of Honduras of the 14th June publishes a circular, which states that the interoceanic railroad advances towards its completion. The first section to Santiago will be completed in the month of November next. The second, which will terminate in the Valley of Comayagua, has been contracted for; the corps of engineers for the purpose have arrived at Port Cortez. The company obliges itself to deliver this second section finished by the 31st December, 1871. Another body of engineers are surveying the third part, as far as the Gulf of Fonseca. A telegraph branch from Port Cortez to unite with the Cuba or Jamaica cable, is to be completed in two years under a penalty. The entire length of the line will be about 200 miles.

Kent County Railroad.

This is a new line on the "eastern shore" of Maryland, extending southwest from Townsend, on the Delaware Railroad, to Chesapeake Bay.

Alexandria & Fredericksburg.

This railroad, which will give Washington direct rail communication with the Richmond & Fredericksburg road, has been surveyed and will soon be located.

Peninsular.

The contract for the construction of the line from South Bend, Indiana, to Chicago was let on the 11th to D. F. Skinner, of Valparaiso.

Indianapolis, Bloomington & Western.

It is announced that the first through train over this line will leave Indianapolis for Peoria at 7 a. m. on September 13th, with an excursion party.

Stage Line to Texas.

The El Paso Stage Company advertises a daily line of stages running from Baxter Springs, the southern terminus of the Missouri River, Fort Scott & Gulf road, southwest through the Indian Territory and to northern Texas. The fares are: to Fort Gibson, $12.00; Perrysville, $27; Bogg's Depot $34.50; Fort Sill, $42; Sherman, $42. All these places are in the Indian Territory except Sherman which is in Grayson county, Texas, 15 miles south of Red River.

New Orleans, Mobile & Chattanooga.

This road is now completed from Mobile to Pascagoula, Jackson county, Mississippi, and the first passenger train passed over that portion of the line on the 6th inst.

Suspension Bridge & Erie Junction.

The Buffalo *Commercial Advertiser* gives the following exact statement of the progress of construction up to last week:

"In order to avoid running through the grounds included in the "Cattle Yards" at East Buffalo, a new line for this end of the route has been surveyed and laid out. The track of the new road will now intersect the main track of the Erie Railway at a point two miles from the depot, corner of Exchange and Michigan streets, and about half a mile east of the Cattle Yards. Inclining thence to the north, the new road passes near the yards, and crosses the track of the Central Yards not far from Batavia street. Operations on this end of the track have not yet been commenced, but the work to be done is of a comparatively light character, and when once begun will require but a short time to finish.

"The rock-cutting on the place of Mr. Brayley (the old Burt Scott Homestead) is about two-thirds completed, and ties and rails are down on a portion thereof, for the use of "construction" cars. Between Eleven Mile Creek and Tonawanda Creek the grading is finished, and the approaches to bridges, piers, cribs, &c., nearly so. Three gangs of men are at work on the line between Tonawanda and Niagara Falls, and the grading on this section is more than half done. About five hundred men, altogether, are actively employed on the road.

"There is about 8,000 yards of heavy rock-cutting to be done on the farm of Mrs. D. J. Townsend, in Niagara Falls village; and this has been commenced, and is progressing favorably. The original contractors have sublet the contract for building the bridges on Scajaquady, Eleven Mile, Tonawanda and Cayuga Creeks, to Messrs. McNary, Claflin & Co., of Cleveland.

"The grading, masonry, bridges, &c., will be completed by the 15th of October. The iron will all be delivered during the last week in September, and it is expected that the laying of the iron will be finished, and the road in running order, by the 15th of November.

Rockford, Rock Island & St. Louis.

The first train from the South ran into Monmouth on the 16th instant. The Rock Island people are agitating the matter of securing the location of the shops at that place.

Chicago & Iowa.

Judge Heaton has granted a preliminary injunction restraining the town officers of Forreston from issuing the $75,000 bonds lately voted.

Winona & St. Peter.

Contractor De Graff has a force of about seven hundred men at work, and is laying track at the rate of a mile a day. On the 13th instant the rails were laid to within eight miles of St. Peter and within three and one-half miles of Mankato. It was expected to reach the terminus, St. Peter, to-day. As the branch of this road running to Mankato requires very heavy grading, which will take some time to complete, arrangements have been effected with the St. Paul & Sioux City Railroad to run trains over that road from the point of junction to Mankato, until the branch line of the Winona & St. Peter Railroad is completed.

New Texas Railroad.

The Legislature has passed a bill, which has not yet been signed by the Governor, granting State bonds to the amount of $10,000 a mile to a road to run from the northeast to the southwest corner of the State. According to the Galveston *News*: "It will start nearly opposite the town of Fulton, in Arkansas, and pass through "Austin and San Antonio to Laredo, on the Rio Grande, "with the view of being extended through Mexico to "San Blas or Mazatlan, on the Pacific." Such a line would form a direct connection with the Cairo & Fulton road for the North and Northeast.

Rhinebeck & Connecticut.

This company has lately filed articles of association in the office of the Secretary of State of New York. The length of the proposed railroad is to be about thirty miles, and is to be constructed from the Hudson River at or near Rhinecliff, in the town of Rhinebeck, through Duchess county, to the line between the States of New York and Connecticut. Capital stock, $1,000,000.

Boston & Maine.

A correspondent of the *Official Railway News* writes as follows of the recently enlarged, improved and renovated Boston passenger station of this road: "The building is nearly 600 feet long, with sufficient tracks to hold 30 large passenger cars, the finish of the entire building is of black walnut, ash and chestnut woods, giving it a lively and cheerful appearance. The lower floor contains the most convenient baggage rooms, gentlemen and ladies' rooms, connected with which is a private dressing room for the use of the passengers, also the best arranged water-closets, barber shop, restaurant and ticket office of any in Boston. The upper story contains large and conveniently arranged rooms for the president, directors, treasurer, and superintendent and officers connected with that road. Telegraphic communication with all railways in the city and all stations upon the road, besides a connection with the City Hall, making it a fire alarm, is had in the Superintendent's office, with a skilful operator. Aside from general offices are pleasant and convenient rooms for conductors, civil engineers, general ticket office with anterooms—in which are 3,000,000 tickets to all parts of the country—also large rooms, in which Mr. Maritt is soon to arrange to do their printing. Around the building, connected with the rooms, is a splendid corridor, which gives a spacious air to the entire building, which has no superior in New England. The cost of these valuable improvements is over $200,000, and much credit is due to the Superintendent for the faithful and energetic manner with which this work has been carried through."

Pennsylvania Railroad.

The office building on the corner of Third street and Willings' alley, Philadelphia, is far too small for the accommodation of the clerks of the company, now that its lines have multiplied so greatly, and a new building on the corner of Fourth street and Willings' alley will soon be completed and fitted up for their use. The old office building has been sold to the Lehigh Valley Company, whose accounts have been kept heretofore in Mauch Chunk, Bethlehem and Wilkesbarre, as well as in Philadelphia.

Little Rock & Fort Smith.

More than one-half of the line from Little Rock to Fort Smith, 160 miles long (266 miles by river), is ready for the iron, and track is laid for 26 miles. It is intended to run trains to Lewisburg, 50 miles, by the 1st of October, and to or near Spadra, 100 miles, by the 1st of January. It is expected that the line will be open to Fort Smith early in 1871.

Cairo & Fulton.

Surveys have been completed for this line from Little Rock to the Missouri line under the direction of A. P. Robinson, Chief Engineer of this and of the Little Rock & Fort Smith road. Surveys of the line southwest of Little Rock are in progress. Nearly 20 miles of the line from Little Rock northward is nearly ready for the rails, and this part is to be in operation by the 1st of December.

Great Western of Canada.

The first of the new narrow gauge locomotives built at the Rhode Island Locomotive Works, has arrived. A number of this class of locomotives have been ordered and will soon be in operation, and it is also intended to change the gauge of those in use, by degrees, with a view to dispensing with the use of the third rail on the line.

West Wisconsin.

The grading is completed from Eau Claire, the present terminus, west to Menominee, fifteen miles, and cars are to be running to that point before winter. Grading from Menominee west to Hudson is to be prosecuted through the winter, and Lake St. Croix will be bridged at the same time. A strong effort will be made to complete the line through to St. Paul before the end of next year.

Iowa Midland.

The Lyons *Mirror* says the company's force is now at work on section seventeen, sixteen miles of the grading

being done. The bridge-builders have completed their work for twelve miles and are pushing on. Section eighteen, which is the one crossing Goose Lake, has been let, as have sections twenty-five twenty-six, twenty-seven and twenty-eight. Other sections are to be let immediately. The chairs and spikes have not yet arrived but are daily expected, and track laying will commence as soon as they are here. Ties are being purchased as fast as they are offered, money to pay for them being advanced when called for by the eastern backers of the Midland.

Western Maryland.

This company is extending its line from Union Bridge westward to Hagerstown and the Potomac at Williamsport. It has recently issued a circular to its bondholders asking their indulgence in the postponement of the payment of coupons until January 1, 1873, and agreeing to pay 8 per cent. interest on all such delayed coupons. The object is to devote all the earnings to the extension. By making this extension immediately the company can obtain $1,400,000 voted by the city of Baltimore to aid in the extension. It is thought that nearly all the bondholders will acquiesce.

California & Oregon.

This road is now completed for 50 miles north of Marysville and is to reach Tehama in a few days. The road will connect at the State line with the Oregon & California Railroad which is surveyed throughout and graded from Portland to Salem, 50 miles.

Canada Pacific.

The Toronto *Monetary Times* says that a committee consisting of Sir Francis Hincks, the Hon. Mr. Aikins, and the Hon. Mr. Morris, has been appointed to consult with the Government of Ontario in reference to the construction of a railroad between Fort William (on the north side of Lake Superior due north of Springfield, Ill.) and the Pacific. It is expected that Ontario will appropriate a portion of her public lands towards this enterprise.

Burlington, Cedar Rapids & Minnesota.

The road is now completrd from Burlington to West Liberty, there making connection with the main line of the Chicago, Rock Island & Pacific Railroad. There are now two daily trains each way, which stop at the following stations: Latty, Sperry, Kossuth, Linton, Morning Sun, Wapello, Long Creek, Columbus Junction, Port Allen, Cone, Nickols, and West Liberty. West Liberty is about 30 miles from Cedar Rapids. From Cedar Rapids northwestward, about 32 miles, the road is in operation to La Porte, and will be completed 15 miles farther to Waterloo, probably next week. We understand that the company is making surveys looking to a continuation of the line northwest from Waterloo.

Ohio & Michigan.

The Coldwater *Republican* of the 20th says: "The Ohio & Michigan Railway has been located northwesterly from this place, by the way of Burlington, Battle Creek, Augusta, and Richland, to Allegan, and southeasterly, *via* Ovid, Alganses, Hall's Corners, Camden, and Amboy to the Ohio State Line, *provided* that the localities through which the road would pass on the above line will transfer their pledged subscriptions to the company stock-bocks, furnish the right of way, and perform such other conditions as the company may require. The engineer corps will immediately commence operations."

An officer of the road writes to us that sufficient subscriptions have been made to warrant the directors to begin the work, engineers have commenced surveying and locating the line between Coldwater and Battle Creek, and as soon as possible after securing the right of way grading will be commenced.

Burlington & Missouri River.

Hall county offers $100,000 to the Burlington & Missouri River Railroad Company to make it the point of junction with the Union Pacific, instead of Kearney. It is the first county east of Kearney.

Missouri River, Fort Scott & Gulf.

A new time table took effect on the 21st inst. According to this one passenger and one freight train run through between Kansas City and Baxter (159 miles); one accommodation and one way freight between Kansas city and Fort Scott (98 miles); one way freight between Fort Scott and Baxter; and one passenger and one freight over this line between Kansas City and Olathe (21 miles), the latter trains running also over the Kansas City & Santa Fe between Olathe and Ottawa (35 miles), and the Leavenworth, Lawrence & Galveston road south of Lawrence.

Northern Pacific.

Last week the contract for the construction of thirty-five miles additional to that previously let, was given to Colonel A. Allen, of St. Paul, and General J. W. Bishop, of Mankato. Their contract embraces that portion of the line lying between the point at which the road will cross the Mississippi River and the crossing of the Crow Wing River.

Central Pacific.

This company, which has long controlled the California & Oregon, the Oakland & Alameda and the San Joaquin railroads, has at last absorbed them by consolidation.

Monee, Crete & Dyer.

This company filed the acceptance of its charter with the Secretary of State of Illinois on the 18th instant. The road it purposes to construct would extend from the Illinois Central at Monee, 34 miles from Chicago, northeast to Dyer, on the Panhandle Line and the Joliet Cutoff, 30 miles from Chicago, crossing the Chicago, Danville & Vincennes road at Crete, 33 miles from Chicago. Its length would be about fifteen miles.

Laclede & Fort Scott.

The company are now advertising for proposals for grading, bridging and masonry for about sixty miles of the line, between Buffalo and the eastern line of Cedar county.

Mississippi & Missouri Air-Line.

The grading of the fifteen miles from West Quincy up the Mississippi to Canton is nearly completed. A part of the force has been transferred to the line west of Canton. A survey of a line from Canton up the river to Keokuk has been made lately, and it is said that this section, which gives a terminus at Keokuk as well as at Quincy, will soon be under contract.

Transcontinental.

The State of Texas has granted to this company, represented by General Fremont and his associates, the right of way through State lands, for a railroad from Fulton to El Paso, across the northern end of the State.

Kansas City & Santa Fe.

The first division of this road, from Olathe, 21 miles southwest of Kansas City, southwest 35 miles to Ottawa, on the Leavenworth, Lawrence & Galveston road, 27 miles south of Lawrence, has just been opened for business. It is operated by the Leavenworth, Lawrence & Galveston Company, which runs a freight and passenger train daily through between Garnett and Kansas City.

Memphis & Charleston.

The stock holders have voted to issue a million dollars of mortgage bonds to liquidate the company's indebtedness to Tennessee.

Lake Superior & Mississippi.

This road was formally opened for business with an excursion from St. Paul to Duluth on the 23d inst. The last rail was laid about three weeks before.

Leavenworth, Lawrence & Galveston.

This road is now open from Kansas City to Ottawa by the completion of the branch *via* Olathe, which occurred on the 22d. This addition of fifty-three miles is an important one for this road, bringing into Kansas City, and connecting with lines east from that point, instead of being obliged to go *via* the Kansas Pacific. It is being rapidly pushed southward to the cattle region, and has already commenced to ship stock northward. There are about 10,000 head of Texas and native cattle in the Romulus tributary to this road, which must find an outlet to the East. When it reaches the Indian Territory (which will be soon), it will afford the best route for the shipment of Texas cattle.

Four new cars from the Aurora, Ill., shops arrived at Ottawa, by way of Kansas City, on the 17th instant. Their aggregate cost was $17,600. The two day coaches cost $7,500 each.

MISCELLANEOUS.

—The Metropolitan (under-ground) Railway of London, during the first six months of this year, carried 19,383,584 passengers, and made a total income of £206,809, including freight receipts and payments from other companies for the use of the road and its stations. The dividend for the six months was only at the rate of 3¼ per cent. for the year.

—Victoria, Australia, has constructed a number of railroads, some of them at a cost of $150,000 per mile. The Government borrowed money at six per cent. to construct, and now obtains an average revenue of three per cent. on the capital invested. Now great economy in the construction of new railroads is enforced.

—A correspondent of an English newspaper suggests an improvement in the present mode of carrying dogs by rail. As large numbers will shortly be sent to the moors, he suggests that the companies should place an airy van at their disposal on certain days, fitted with rings and staples and a cask of water. Dogs do not require food so much as fluid; the latter is essential to their comfort. Or better still, to send these poor brutes in boxes with iron gratings at either end, and fixed troughs which may be filled from the outside. These boxes may be used as kennels during their stay on the moors, and can be rendered cool and waterproof by roofing them with turf.

—The traffic receipts on the six principal railroads in France for the twenty-six weeks ending the 30th of June last, amounted on 10,288 miles to £13,643,615, and for the corresponding period last year on 9,926 miles to £12,611,581, showing an increase of 362 miles and of £1,032,034, or 8.18 per cent. in the receipts. The total receipts on the Paris & Lyons old and new lines amounted to £4,381,757, against £4,074,393 in the corresponding period of 1869, showing an increase of £307,364; on the Eastern of France old and new lines, to £2,372,734, against £2,178,799, showing an increase of £193,935; on the Paris & Orleans old and new lines, to £2,365,109, against £2,215,468, showing an increase of £149,641; on the Northern of France old and new lines, to £1,915,617, against £1,736,801, showing an increase of £179,316; on the Western of France old and new lines, to £1,635,642, against £1,559,056, showing an increase of £76,586; and on the Southern of France, to £972,756, against £847,564, showing an increase of £125,192. The average receipts per mile for the twenty-six weeks amounted to £1,326, against £1,270 in the corresponding period of 1869, showing an increase of £56 per mile.

—The following dividends have been declared recently by British railroad companies: London & Northwestern, 6 per cent.; Bristol and Exeter, 4; Great Northern, 5; Midland, 6¼; London & Southwestern, 4; Maryport & Carlisle, 10; Ulster, 5.

—The board of Austrian Lloyds have arranged for a regular and direct line of vessels between Trieste, London, Liverpool, and Southampton. By this means goods from the manufacturing centres of North Germany for England, as well as American ports, will be enabled to be forwarded to their destination, notwithstanding the existence of any blockade of the North German ports, provided they are sent *via* Trieste.

—The European war may delay the commencement of the Mont St. Gothard Tunnel and the completion of the Mont Cenis Tunnel. The former is to be built with Prussian capital, and the latter is a French enterprise. The St. Gothard Tunnel will give Germany an independent route into Northern Italy, and before the war was looked upon with jealousy by France.

—The great bridge to be erected over the Delaware between Philadelphia and Camden is declared a post route by act of Congress, approved June 28, 1870.

—The earnings of the Suez Canal have not been sufficient to pay the interest coupons due July 1st. Although the payment has been deferred, the directors state that the coupons will take precedence in the future distribution of the earnings, which it is hoped will, by the growth of the traffic, soon increase rapidly.

LOCOMOTIVE STATISTICS.

Toledo, Wabash & Western.

Mr. T. G. Gorman, Master Mechanic of the Illinois Division of the road, reports for the month of July, 1870:

Miles run by passenger engines	46,760
" " freight engines	71,500
Miles run to ton of coal—passenger	57.9
" " " —freight	60.2
" " pint of oil—passenger	17 0
" " " —freight	20 7

Sixteen passenger and 38 freight locomotives have been in service during the month.

Mr. R. Andrews, Superintendent of the Illinois division, writes: "We have been using coal burners for a "number of years and by considerable experimenting, "adapting them to the economical consumption of our "Illinois coals, have reached a point of fair success. I "am not aware of any road that can make a better ex"hibit in the economical use of coal consumed on loco"motive engines, than we can on this division."

Michigan Central.

The following is the report of the general average of performance of locomotives on all divisions of the Michigan Central for the month of July, 1870, as made by A. S. Sweet, Locomotive Superintendent:

Number of freight cars drawn one mile	2,275,141
Equal to cars drawn over entire line	8,011
Number of freight cars drawn one mile in June	2,155,491
Equal to cars drawn over entire line	7,589
Number of miles run to 1 pint of oil	13.66
" " " 1 cord of wood	37.25
" " " 1 pint of oil in June	13.04
" " " 1 cord of wood "	37.62
Average number of miles run per ton by coal-burning engines	41.53
Average number of miles run to one ton of coal in June.	40.50
Average of freight trans cars	23.26
Average size of freight trains in June "	23.45
Number of gallons of oil used	2,066¾
Number of cords of wood used	4,416
Number of tons of coal used	1,618
Number of miles run by passenger trains	77,781
" " " freight trains	103,221
" " " miscellaneous trains	16,092
" " " training engines	31,075
Total	228,169

OLD AND NEW ROADS.

[*Continued from Page* 512.]

Kankakee & Illinois River.

The Executive Committee advertises that it will receive proposals for the grading, bridging and culverts on the line of this road through Kankakee county, about 38 miles, up to noon of the 1st of September. The office of the committee is at Kankakee.

Cairo & Vincennes.

Wabash county has voted down the proposition to extend the time for the completion of this railroad; and the Cairo City Council has done likewise with reference to that city's subscription to the same road. In the two cases the sum of $175,000 is involved.

Atchison & Nebraska.

A telegram from Atchison says that on the 24th inst. the Atchison & Nebraska Railroad Company closed a contract with J. F. Joy for the completion of its road by January 1, 1871, and that arrangements are being made to extend the road to Lincoln and Omaha. The contract includes a bridge over the Missouri at Atchison.

Colorado Central.

The line of this road from Denver west by north to Central City, has been graded for some time, and now will soon be completed. Most of the iron has been received, and also a locomotive. It will give tourists direct access by rail to the mountains.

Omaha & Southwestern.

This company expected to have twenty miles of road completed by to-day, reaching a point on the Platte River near Ashland.

Celina, Huntington & Chicago.

A company with this name was organized at Rochester, Ind., on the 18th inst. It purposes to construct the Indiana section of the Baltimore & Ohio's proposed Chicago and Pittsburgh line.

Arkansas Railroads.

Mr. D. R. Sickels, Financial Agent of the State, gives the following rather glowing account of the condition of the roads now in progress of cons ruction in the State:

"The Memphis & Little Rock Railroad has recently been opened to Brinkley, and passengers from Memphis can now reach Little Rock in about twelve hours. The completion of the road before the 1st of January is positively assured. The Little Rock & Fort Smith road is finished as far as Gold Creek, a distance of eighty miles from Little Rock, and the rails will be down to Lewisburgh in about two weeks. On the Little Rock, Pine Bluff & New Orleans Railroad, thirty-five miles have been graded and made ready for ties; iron rails, with fastenings, sufficient to complete ten miles of track, are now at Chicora, the terminus of the road; and it is the intention of the company to have trains running through to Pine Bluff by the 1st of January. The Mississippi, Ouachita & Red River road has over 500 laborers employed, and about twenty miles of road-bed has been prepared for the rails, which are now on the ground. It is asserted that in less than twelve months Arkansas will have over 500 miles of railroad in operation through the richest sections of the State."

Pacific of Missouri.

This company has at last succeeded in negotiating new leases of the Missouri River and the Leavenworth, Atchison & Northwestern roads, in place of the old ones. By these new leases it pays a rental of $50,000 per year for the Missouri River road, instead of $67,500, and a much less sum than formerly for the Atchison road.

Chicago, Pekin & Southwestern.

Hon. John B. Colus, of Pekin, the Attorney of this company, charges that the contractors have obtained control of the directors, and intimates that they are likely to use their power for their advantage as contractors. He says in a letter to the Pekin *Register:*

"While we have subscribed $180,000 to that road, nearly, if not quite, $9,000 per mile of its line in this county, and of this sum the contractors have received $145,000, including the bonds of the town of Washington, the road in our county is neither graded, bridged nor tied. Of this sum received by them, they have not expended in this county to exceed $60,000. The remainder has gone, no one knows whither. But some of it is said to be invested in timber lands and a saw mill in Michigan, and some in the erection of a bridge across the Illinois river at Marseilles. * * * *

"If they continue to be supine and apathetic, they will not long have the power to obtain an account, or to guard the interests of this people. The contractors are so managing in the board, that at the next meeting of the stockholders they will control the election, and electing their own creatures, they will build the road, or be released from building any particular portion of it as they shall consider best for their pecuniary interests. An unfinished roadbed between Pekin and Washington will be a poor equivalent to this county for $180,000 received by the contractors."

Chicago & Southwestern.

The road has been completed from Washington to Brighton, thirteen miles, and will soon be opened to Fairfield (where it crosses the Burlington & Missouri River road) fifteen miles further. By the 1st of October it is to be completed to the Des Moines River, 45 miles from Washington.

ELECTIONS AND APPOINTMENTS.

—The following gentlemen have been elected directors of the new Athol & Enfield Railroad Company, of Massachusetts, for the ensuing year: Willis Phelps, of Springfield, Edward Smith, R. D. Woods, and W. B. Kimball of Enfield, R. H. Allen of Prescott, S. P. Bailey of Greenwich, C. Southworth, of Hardwick, J. W. Goodman, of North Dana, Samuel Adams, of New Salem, J. C. Hill and T. H. Goodspeed, of Athol. At a subsequent meeting of the directors, the following officers were chosen: President, Willis Phelps; Vice-President, R. D. Woods; Clerk, T. H. Goodspeed; Treasurer A. Harding of Athol.

—John P. Horton, who was until lately Northwestern Passenger Agent of the Chicago & Northwestern Railway, and is a genial gentleman as well as an efficient railroad officer, has been appointed local passenger agent of the Erie Railway at Cincinnati, and will occupy that position on and after the 1st of September. Mr. Horton was for ten years a railroad man in Cincinnati and therefore knows the ground thoroughly as well as the business. He succeeds Mr. G. G. Cooke, who has been made General Agent of the Indianapolis & St. Louis Railroad, with headquarters at Indianapolis.

—George T. Noble, late Superintendent of the Eastern Division of the Kansas Pacific Railroad, has been promoted to the position of Assistant General Superintendent of the same road.

—M. M. Martin has been appointed Assistant General Superintendent of the Ohio & Mississippi Railroad. He was formerly Master Car Builder.

TRAFFIC AND EARNINGS.

—The traffic receipts of the Grand Trunk Railway of Canada for the week ending July 30 amounted to £28,000, against £26,300 in the corresponding week of last year.

—The traffic receipts of the Great Western Railway of Canada for the week ending July 29 amounted to £13,338, against £12,670 in the corresponding week of last year.

—The Negaunee (Lake Superior) *Review* gives the shipments of iron ore over the Marquette & Ontonagon Railroad for the week ending August 16, at 16,660; and of pig iron, 1,068 tons. Number of car loads of iron ore shipped from Negaunee on the Peninsula Division of the Chicago & Northwestern Railway for the week ending August 16, 2,452; pig iron, 300 tons.

—The following is the official statement of the earnings and expenses of the Western Union Telegraph Company for the month of June:

	1869	1870	Increase.
Receipts	$590,994 31	$598,749 31	$7,755 00
Expenses	381,546 85	422,819 38	41,272 53
Net profit	$209,447 46	$175,930 93	$33,517 53

PERSONAL.

—W. D. Rawley, lately Master Mechanic of the Missouri Valley Railroad, was last week presented with an elaboratel. inscribed and engraved gold watch chain by the old employes of the company. Mr. Rawley has been appointed Master Mechanic of the Central Branch, Union Pacific Railroad.

—T. W. Wason, the well-known car builder of Springfield, Mass., died on the 20th inst. at the age of fifty-nine. He was President of the Wason Car Company.

—A. G. Black, Grand Chief Conductor of the Railroad Conductors' Association of the United States, died at his residence in Wooster, Ohio, on the 23d inst.

MECHANICS AND ENGINEERING.

Electric Railroad Signal.

The other day we inspected an unique and ingenious invention of Mr. Robinson, of Pioneer, Pa. It consists of electric wires, so arranged, that about a mile and a half or two miles from a crossing the car wheel will press a wire against the track, completing the circuit and setting a bell to ringing, which continues until the train has passed the crossing, when the circuit is broken and the bell ceases.

Again a mile or two from a station, a wire is placed, which is pressed against the track by each wheel and springs up on the removal of the weight. Thus with each completion of the circuit a tap is rung on the bell at the station and the direction, distance, rapidity and length of the approaching train is designated. When a switch or drawbridge is out of place, the approaching train will sound an alarm at the station and throw up a signal, to warn the engineer of his danger.—*Titusville Herald.*

Preserving Wood.

In the *Annales du Genie Civil*, Dr. Reinsah gives the following directions for rendering wood difficult of combustion and preserving it underground: "The wood, unplaned, is to be placed for twenty-four hours in a liquid composed of one part of concentrated silicate of potassa and three of pure water. After being removed, and dried for several days, the wood is again to be soaked in this liquid, and, after being again dried, painted over with a mixture of one part of cement and four parts of the above liquid. When the first coat of this paint is dry, the painting is to be repeated twice. This paint mixture should only be made up in small quantities, as it rapidly becomes dry and hard. Wood thus treated becomes uninflammable, and does not decay underground."

Petroleum as Locomotive Fuel.

An experiment was made recently with a locomotive on the Pennsylvania Railroad at Altoona, fitted to burn petroleum. In seventy minutes from the time of lighting the fire in a cold locomotive, the boiler was filled to the limit of pressure, and the locomotive was run up the mountain. The process seems to have been something like that used here on the Northwestern road some time ago.

Troy Steel Rails.

The Troy *Press* says that work in the Bessemer steel Works of that city is more brisk than ever before Fourteen "heats" are run out every twenty-four hours now, against twelve heretofore, making on the average seventy tons of steel per day. The manufactured steel goes to the Rensselaer Works where it is rolled into rails. There is great demand for steel rails on the Southern and Western Railroads.

Keokuk Bridge.

This bridge, which the Keystone Bridge Company is constructing, is to be completed next November. It will be 3,200 feet long, with a curved embankment approach 600 feet long, crossing the levee by an iron bridge which connects it with the Des Moines Valley Railroad, on the Iowa side. On the Indiana side the approach is 750 feet long. Five piers are completed and three others, including the pier for the draw, are commenced.

Narrow Top Road Beds.

Gen. T. F. Sickles, the Chief Engineer of the Union Pacific Railroad, recently inspected the recently constructed Davenport & St. Paul Railroad, which has a very narrow road bed, and was much pleased with the construction of the line. The Burlington *Hawk Eye* reports his opinion on the road bed as follows;

The roadbed itself was particularly the object of Gen. Sickles' praise. This competent engineer is emphatic in declaring his confidence that the narrow top roadbed, with a slope of eighteen inches to each foot of fill, makes the most durable and safe, as well as the least expensive road. The width of road surface being only that of the length of the ties, there is no surplusage of area on which the rain may fall and water lay to soak the ground and rot the ties, but the rain falls immediately from the end of the ties down the bank. So decidedly opposed is General Sickles to the wide surface road bed where only a single track is required, that he has, as an engineer, in some instances, on roads under his charge, insisted on the cutting down and narrowing of the fills."

—The California Pacific Railroad is doing an immense business in freighting wheat. All along the line of the road immense piles may be seen waiting for transportation. Thousands of tons, quantities far exceeding the capacity of the road to move in a day or a week, are constantly in readiness. Notwithstanding some 600 tons of grain, principally wheat, arrive daily at Vallejo, there is no diminution, but rather an increase in the constantly accumulating piles. Several months must elapse, before the last sacks will find their way to shipping. Large quantities of grain are now being brought down from the regions of Stockton and beyond by the Central Pacific Railroad. The wheat which is transported over this route is shipped direct from the railroad terminus at Oakland. Conveniences for weighing and loading have been provided by the company. Last year the expenses of transporting wheat from Paradise Valley to this city were $9 per ton. This year all goes to Oakland at a cost of only $4.95, or a clear saving of over $4 per ton! The loss from handling, etc., has also been reduced from a very considerable figure to a mere item.—*Scientific Press.*

—On the 1st of October the Act of Congress which repeals the United States tax of one-eighth of one per cent. on the receipts of city passenger railroad companies goes into effect.

RAILROAD GAZETTE

PUBLISHED EVERY SATURDAY.

CONTENTS.

Editorial Announcements.

Correspondence.—We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

Inventions.—Those who wish to make their inventions known to railroad men can have them fully described in the RAILROAD GAZETTE, *if not previously published,* FREE OF CHARGE. *They are invited to send us drawings or models and specifications. When engravings are necessary the inventor is expected to furnish his own engravings or to pay for them.*

☞ *Our Prospectus and Business Notices will be found on the last page.*

TESTING BESSEMER STEEL.

The very remarkable property of remaining soft and without any sign of hardening when quenched in water which that grade of steel usually known as "decarbonized" metal possesses, has been made for several years the basis of some of the most important tests of the quality of Bessemer steel ingots, and, in part, a measure of classifying them as they come from the converting works and before they undergo any further manufacture.

A small ingot is cast from a hand-ladle filled at the middle of the pouring of each charge, and this ingot is drawn down to a bar ½ inch square, which is then examined in various ways—by bending both hot and cold, by welding, by drawing down to a thin edge, etc.

In nearly every case an accurate judgment may be formed of the suitableness of the ingots cast from the charge corresponding to the test ingot under examination, either for rails, axles, or such other purposes as current use may require; and it is found by our best steel rail makers that a metal can be uniformly produced for rails that will thus bend double in the bar drawn from the test ingot after it has been heated and quenched in water. It is also found that this test of a small bar corresponds very fairly in its result with the test, applied by some rail makers to the rail itself, of a two-feet blow of a five-ton steam hammer. The crop end of the rail, 18 inches or two feet long, is placed on a cast-iron block fitted to the anvil, and giving two points of support to the rail end 12 inches apart. The hammer then is allowed to fall two feet and strike upon a short piece of three inch round iron placed on the head of the rail, midway between the points of support, in order that the whole force of the blow may be concentrated at this single central point.

The average deflection of one lot of 4,000 rails tested by this means was found to be ⅜ of an inch in this distance of 12 inches between the points of support, and in nearly every case the great ductibility of the metal even when cold was shown by a drawing down or stretching of the flange of the rail caused by the bending under the blow of the hammer.

Some ends, which for special reasons were tested under the hammer until entirely broken up and destroyed, showed a degree of malleability hardly to have been expected in any metal except soft copper or lead; and yet the perfect endurance of such rails under the shocks and abrading action of passing engines and cars shows most certainly that the strength due to perfect *homogeneity* of structure, and a consequent perfect distribution of the strain brought upon the rail, is the quality most needed and most sure to be found in a well made steel rail, and found too when the metal is amply hard enough to resist for many years the usual wear.

It is true that a very small percentage of the steel rails supplied by the best makers fail, sometimes within a very few months after they are first laid, but this fact cannot be fairly urged against their use, or their safety, any more than can the fact be urged against the use of our common chilled wheels that twenty-five per cent. of those put into use fail for various causes within two or three years after wear upon them begins, while the remainder may be counted on for twelve or fifteen years' service.

Hardly any branch of manufacture can produce goods that in the early part of their use do not show a sifting out of that which for concealed or obscure causes is imperfect. And no one can reasonably require that the steel manufacture, combining as it does difficulties to be surmounted which are exceeded in no other technical processes, should be infallible or less liable to mistake than the utmost painstaking and rigid examination will insure.

DULUTH AND THE TRADE OF THE NORTHWEST.

At the extreme western end of Lake Superior, a little north of the mouth of the St. Louis River and within the State of Minnesota, is a little town named Duluth. Its meridian is forty-eight miles west of St. Paul and it is nearly 125 miles further north. The railroad connecting St. Paul and Duluth, completed this month, is 154 miles long. This new town and embryo city is the westernmost harbor of the Great Lakes. It is 235 miles further west than Chicago, and yet not very much further from Buffalo, the distance from the head of Lake Huron southwest to Chicago being not much less than the distance from the same point west to Duluth. The distance to Duluth is about eighty miles the greatest. This is but a trifle in lake navigation, giving Chicago just about the same advantage over Duluth that Milwaukee has over Chicago. A greater disadvantage is the navigation of the St. Marie Canal, which forms the entrance to Lake Superior, and adds tonnage and tolls to the expenses of vessels between Duluth and the lower lakes. This is not very burdensome, however, and if the day comes when cargoes are readily obtained to and from Duluth, freights will not be likely to be much higher from that port than from Chicago. Probably when wheat is six cents a bushel to Buffalo from Chicago, it will hardly be more than six and a half cents from Duluth.

By virtue of its situation at the head of navigation in the West and its new connection with St. Paul and the railroad system of Minnesota, this new town claims that it must become the shipping port for all Minnesota and Northern Wisconsin and the country west of them, and even for a part of Iowa and for Nebraska It thus enters a field which hitherto has belonged almost wholly to Chicago and Milwaukee, and threatens to put a limit to the extension of our trade with Minnesota and the Northwest. It is therefore proper that we should examine the field and learn what basis this infant competitor has for its great claims.

Draw a line from Green Bay a little north of Menominee in a southwesterly direction, passing about six miles southeast of Steven's Point, three miles northwest of Tomah, crossing the Mississippi ten miles south of La Crosse, passing, in Iowa, five miles northwest of Decorah, seven miles southeast of Charles City, two miles southeast of Hampton, six miles southeast of Webster City, through Carrollton and Harlan, the county seats of Carroll and Shelby counties, crossing the Missouri a little above Omaha, and passing not more than three miles northeast of both Omaha and Lincoln, Neb., and thence on through Kansas and the territories, crossing the Kansas Pacific Railway near Ogallah station (312 miles west of Kansas City), and near but a little southwest of Santa Fe, New Mexico, and Tucson, Arizona, crossing into Mexico near the 111th meridian, and striking the Pacific coast about 600 miles south of the California line. All points on this line are equidistant from Chicago and Duluth. All northwest of it are nearer Duluth; all southwest nearer Chicago.

Let us see what territories are included in the districts this side of the line. There is a little less than half the territories but quite four-fifths of the population and the cultivated land of Wisconsin; of Minnesota, parts only of *three townships* in the extreme southeast corner; two-thirds of the territory and most of the population of Iowa; the southeast corner of Nebraska, including about eleven counties; all of Kansas except the northwest corner (which is barren); just a corner of Colorado; about half of New Mexico, and the southeast corner of Arizona. All Minnesota, the northwest third of Iowa, most of Nebraska, nearly all Colorado, half of New Mexico, most of Arizona, to say nothing of all the Pacific States and Territories, Utah, Wyoming, Idaho and Dakota, and all British America, are nearer Duluth.

The line of equi-distance between Milwaukee and Duluth touches Lake Superior some distance east of Marquette, and passes twenty miles southeast of that place, seven miles northeast of Black River Falls, crosses the Mississippi three or four miles below Winona, the north boundary of Iowa just where the Milwaukee & St. Paul Railway crosses it, passes on its way through Iowa near Mason City and Fort Dodge, crosses the Missouri six miles north of Omaha, and in its southwestern course passes through Lincoln, Nebraska. So we have nearer Milwaukee more than half of the territory and probably nine-tenths of the population of Wisconsin, one county and parts of two others in the southeast corner of Minnesota, and all Iowa except one-fourth in the northwest corner. Nearly all of Minnesota, the northwest corner of Iowa, and all the territory west of these States, are nearer Duluth.

Of course Duluth cannot expect to obtain the traffic of all the territory which is nearer to it than to Chicago or Milwaukee. We do not imagine that it will have any considerable intercourse with Santa Fe or Arizona, or even with California, Utah and Colorado, probably not much with Wyoming, Nebraska, and Iowa, and certainly it will not monopolize the traffic of Southern Minnesota. Baltimore and Mobile are the seaports nearest to Chicago, but neither has a fraction of the business that other seaports obtain. There are established currents of trade that cannot easily be turned. These currents here are generally in an east and west direction. Produce generally seeks New York It will move from New Orleans northeast, but not from Iowa or Northern Illinois. Produce south of a line west from New York may be drawn northwards as far as that line on its way to the East, but not much further north. Strong efforts have been made to get shipments of cotton from the South to the East through Chicago, but with poor success, though Chicago is nearly due east of the cotton factories. A great deal goes through Cincinnati, very little through Chicago. On the other hand, very little of the produce of Iowa, Minnesota, Wisconsin and Northern Illinois ever goes so far south as the Ohio River, not much even so far as Indianapolis and Columbus, on its way to the East. Chicago, more than any other interior city, has been successful in commanding trade from a broad, as well as a long belt of country. It has reached, not only to San Francisco, but, what is more difficult, also to the Indian Territory and to Northern Minnesota. It has now remarkable advantages for trade—better than any other lake city can hope to have for many years. Duluth may be as near Buffalo *by lake* as is Chicago, but Chicago has direct railroad connection by several different routes, not only affording communication when the lakes are closed, but giving the rapid transportation route which a very large share of merchandise demands, even at three or four times water rates. These advantages tell especially in the business of distributing merchandise, which employs many times more people than the transfer and shipping of produce. Perhaps the greatest of the commercial advantages of Chicago are supplied by the magnificent system of railroads into the interior—to the South, Southeast, West, Northwest and East—which give it unsurpassed facilities for receiving produce and distributing merchandise. These roads, constructed for the purpose of carrying traffic to and from Chicago, reach as far northwest as Mankato, Minn., will soon reach St. Paul, and extend southwest as far as the Indian Territory, and south to Cairo. Of course there are other connecting lines of importance, such as the Union Pacific and the Kansas Pacific, but those we speak of cannot be used to advantage to carry to any other city. It makes little difference to the Union Pacific whether its traffic goes to Chicago, to St. Louis, to Milwaukee, or to Duluth, after it reaches Omaha; it makes a great difference to the Chicago, Rock Island & Pacific if its traffic eastward leaves it at Davenport to go up or down the Mississippi, or anywhere else than to Chicago. All these railroads diverging from Chicago are so many active agents working eagerly to increase its business, because its business is their business and its prosperity their prosperity.

Milwaukee lacks the advantage of direct and competing railroad outlets to the East; but it has, though in a less degree, the advantages of a railroad system to the interior which can thrive only by carrying passengers and freight to and from Milwaukee.

Duluth has one indirect outlet to the East, by way of St. Paul and Chicago, and its railroad system to the interior is only just begun. But if the advantages of the

situation prove sufficient, doubtless such a system will be developed rapidly.

Immediately, however, this very season, Duluth begins to compete with Chicago and Milwaukee for the wheat trade of Minnesota. This is a great prize—greater in Minnesota than in any other State, for wheat is almost the only export of that State, and its production increases with great rapidity and is likely to until its exports of this grain are as great as the receipts of Chicago and Milwaukee combined at the present time. The Minnesota wheat trade will soon be great enough to sustain a city larger than Milwaukee, and if Duluth can obtain it, its future is secure.

We have seen that nearly all Minnesota is nearer to Duluth than to either Chicago or Milwaukee. This advantage in distance, however, is of very little account unless the routes of transportation are shorter; and even shorter routes of transportation will not avail, if those routes are controlled in the interest of other cities at their termini. A railroad company will discourage shipments to Duluth over fifty miles of its line, when if they go to Chicago it will carry them 300 miles. But let us ascertain the distance to the three lake ports in question from some points in Minnesota and Iowa.

At present the distance by rail from Chicago to St. Paul is 441 miles, but the route is not direct, the Chicago & Northwestern providing 99 miles of it, to Milton Junction, and the Milwaukee & St. Paul the rest. The new lines which the Chicago & Northwestern has under way will not only give it an independent route, but a much shorter one. The distance from Chicago to Madison by the Northwestern is now 138 miles; by constructing a line less than eight miles, from Shopiere, on the Wisconsin Division, westerly to Afton, on the Madison Division, this distance can be decreased to 130 miles at most. The Baraboo Air Line, just commenced, from Madison to La Crosse, will be about 120 miles long. From La Crosse to Winona, the "Eastern Connection," now ready for the iron, will be 27 miles long. From Winona to St. Paul, the St. Paul & Chicago Railroad, which is in a fair way to be completed next year, will be about 110 miles long. Thus we will have a route from Chicago to St. Paul about 387 miles long. Without the Shopiere & Afton cut-off, the distance would be 396 miles, which is ten miles less than the distance from Milwaukee to St. Paul by the present route. The latter company's line, however, is likely to be materially shortened by the completion of the West Wisconsin Railway to St. Paul. This road from Tomah to St. Paul will be 179 miles long, and as Tomah is but 153 miles west of Milwaukee the distance from Milwaukee to St. Paul by this route will be only 323 miles. Both these new routes are pretty sure to be opened before the end of 1871, and in making our calculations for the future, it will not be amiss to make the distances by these routes our basis. They are both, moreover, direct lines, as nearly straight as it is easy to construct lines; so we may expect no shorter routes hereafter. In round numbers we may say that the distances from St. Paul will be: to Chicago, 355 miles; to Milwaukee, 325 miles; to Duluth, 155 miles.

In the table below we have given the distances by the existing routes, by rail where railroads exist, but in a few cases estimated distances by the river route are given:

DISTANCES TO DULUTH, CHICAGO AND MILWAUKEE.

From	To Duluth. Miles.	To Milwaukee Miles.	To Chicago. Miles.
St. Paul	154	406	441
Hastings	178	400	435
Red Wing	200	286	373
Winona	364	222	309
La Crosse, Wis	391	195	282
Mc Gregor, Iowa	369	1b4	229
Dubuque	445	260	188
Faribault, Minn	210	350	385
Owatonna	235	335	370
Rochester	265	312	399
Austin	258	305	340
Lanesboro	299	246	333
Albert Lea	277	322	409
Wells	297	342	429
Charles City, Iowa	305	284	393
Waterloo	347	336	286
Shakopee, Minn	284	423	458
St. Peter	229	367	454
Mankato	240	358	445
Sioux City, Iowa	480	562	517
Omaha, Neb	530	531	492

[The road is yet to be built which will give Duluth this connection with Sioux City, and distances to river towns as far south as La Crosse are given by a railroad not yet finished.]

When the improvements now in progress are completed, the distances from Chicago to Hastings, Red Wing, Winona, Faribault, Owatonna, Rochester, St. Peter, and Mankato will be less by 36 miles, the distance from Chicago to St. Paul, less by 54 miles, the distances to La Crosse, Lanesboro, Albert Lea, and Wells less by 32 miles; and the distances from Milwaukee to St. Paul and a few other points less by 83 miles.

Enough has been shown to indicate that by existing routes of transportation Duluth has the advantage in distance from all Mississippi River towns north of Winona, for all Minnesota stations on the Milwaukee & St. Paul road nearly as far south as Ramsey, and to nearly all places west and north of that road. For stations on the St. Paul & Sioux City road the advantage is greater, the distance from Mankato being 80 per cent. greater to Chicago than to Duluth. For stations on the St. Paul & Pacific road, now extending nearly across the State, the difference in favor of Duluth is just the same as from St. Paul, as all its traffic must pass through that city. It is easy to believe that the Lake Superior & Mississippi road can afford to take freight from St. Paul 154 miles cheaper than the Chicago and the Milwaukee roads can take it 441 and 406 miles respectively, or even 387 and 323 miles, by new routes.

Only two of the roads which enter St. Paul (the St. Paul & Pacific and the St. Paul & Sioux City), however, are likely to carry freights to the Lake Superior road. The Milwaukee & St. Paul wishes to carry everything to Milwaukee; the St. Paul & Chicago (St. Paul to Winona), when completed, will seek to get business for Chicago. The Hastings & Dakota, which has 30 miles in operation, is controlled by the Milwaukee & St. Paul Company. The Winona & St. Peter, which will very soon have 145 miles in operation through a very productive wheat country, is the property of the Chicago & Northwestern; the Southern Minnesota, which in a few weeks will have about 150 miles extending west from La Crosse, claims to be independent, but must deliver its grain either to river boats or to the Milwaukee & St. Paul, and it has been suspected that the latter company controls it. There is then left for the St. Paul & Duluth line the traffic of the St. Paul & Sioux City and the St. Paul & Pacific, that carried by teams to the Mississippi River towns, and perhaps that delivered opposite La Crosse by the Southern Minnesota.

If grain can be carried from Duluth to Buffalo as cheaply, or nearly so, as from Chicago and Milwaukee to Buffalo, then Duluth ought to receive from the three routes mentioned large amounts of wheat, and the Chicago and Milwaukee railroad companies will find it necessary to make greater exertions to secure their old trade than they ever have made or are ever likely to make to prevent shipments to St. Louis. Their lines in Minnesota will give them control of considerable amounts, but for the river business there is likely to be a warm competition and rates must be very low to obtain grain from the lines southwest and northwest from St. Paul. The Duluth road can afford to carry for less than half as much as the Chicago and Milwaukee lines. If they make the rate ten cents per bushel, it can make it five cents, and then the saving will nearly pay the freight to Buffalo.

In considering this subject, it should be remembered that a railroad and a harbor (and Duluth can hardly be said to have a harbor as yet) are not complete facilities for transportation. Besides a harbor at the point of transfer, a city is needed, with all the trade and warehouses and stores of a city. Vessels can never carry grain from Duluth to Buffalo or Erie as cheaply as from Chicago until they can obtain cargoes for Duluth as easily as for Chicago. Warehouses must be built and trade developed before vessels can afford to take cargoes from the new town at the lowest rates. Hence the trade of the place may be light at first and develop slowly, much to the disappointment of many who have expected it to become a great city almost in an instant, and cause the cities with it has ventured to compete to look upon it with scorn, rather than fear or envy, for a time. But the construction of the Northern Pacific Railroad is likely to give at this time considerable cargoes to Duluth, and as soon as its elevator is in order we may expect grain shipments to begin. At least the Lake Michigan cities should watch its progress carefully and ascertain how far the new city of Minnesota can limit their trade with the Northwest.

HARMONY AT LAST.

The report of an arrangement of difficulties between the through lines from New York to the West has been confirmed. The rates on the westward bound freight were raised last Monday. No other changes of rates have been made yet, but some are expected, and if the reports are true, the result of the recent conference is something more than harmony and something like a combination which will do away with much of the ordinary competition. Just what the terms of the agreement are has not yet been made known here, except by the New York papers. The New York *Evening Post*, a newspaper usually well informed and exceptionally careful in its statements, gives them as follows:

"The cutting competing prices for the transportation of cattle, sheep and hogs, between the western and eastern markets which for the past two months have been merely nominal at $1 per car-load between Buffalo and New York, have been increased to $140, with the probability of a still greater advance before the first of October.

"The Erie and New York Central management are said to have also agreed not to extend their transportation contracts and privileges with the United States and American express companies, and that these railway corporations will soon establish express departments themselves over their own several rail lines.

"No further advance in the prices of tickets to western and southwestern points beyond the the moderate advance which was made last week has yet taken place, but the Broadway agents anticipate an increase on Chicago, St. Louis and Cincinnati fares in a few days, the arrangements for a general advance having been nearly completed.

"If the representatives of the three roads can agree, and there is said to be every prospect of a definite settlement of differences, there will soon be a division of business between them, the larger proportion of the live stock and heavy weights to be shipped by the Erie road, which has the best facilities for the same, and the bulk of the through passenger traffic by the New York Central and Pennsylvania Central.

"At present nothing definite as to the agreement can be given, but it is understood that an amicable joint arrangement will be adjusted to the mutual advantage of each company."

The important thing in this is the reported probable division of business. It is not easy to conceive of all the results of such an arrangement. It is true that it will be likely to do away with competition, but that has been equally true of all other harmonious agreements on rates, and if we may judge by the present rates on westbound freight, the rates will be lower than by most tariffs heretofore fixed by agreement. But a permanent combination will also greatly decrease the expenses of the different lines. The large force and lavish expenditure for obtaining business will be dispensed with, and when the companies have only to pay for doing their work and not for getting work to do, they can afford to carry at rates considerably lower than their average charges have been. If the railroad companies will reduce their rates in proportion to their saving of expenses by the cessation of competition, the public will have reason to rejoice over the combination.

If the true history of the freight war of the past few months, with detailed accounts of expenses and receipts were written, it would prove one of the most instructive documents in the literature of transportation. We may be able to approximate to the truth when the annual reports of the companies concerned are published; but these will not tell all. It would be interesting to know just how much traffic was increased by very low rates, which lasted for some months, and what proportion the actual expenses during these months bore to the income. If the large traffic brought a large profit, we may be sure that the rates would not have been changed; but was anything more than expenses made, and if so was it enough to pay dividends?

Next week we shall probably know how much of these reports from New York are true, and also what arrangements have been made concerning the troublesome questions concerning Boston tickets and the time to New York.

THE GENERAL TICKET AGENTS' ASSOCIATION.

At the last meeting of this association it was determined that the next regular semi-annual meeting should be held in Milwaukee on the 28th of September. Since that time it has been determined to hold the Wisconsin State Fair at Milwaukee the same week, and also at the same time and place a general reunion of the soldiers of that State. This makes it certain that comfortable accommodations for the ticket agents could not be obtained there at that time, and therefore the Executive Committee, after conferring with many of the members, have ordered a special meeting to be held at the Tremont House, Chicago, on Wednesday, the 28th of September, at 10 o'clock a. m.

An invitation has been issued through Francis Colton, General Ticket Agent of the Union Pacific Railroad, to all general ticket and passenger agents, and to general freight agents also, to make a trip over that road and the Central Pacific and return, starting two weeks or more before the meeting of the association, and returning just in time to attend it. The agents are invited to take their wives with them. This invitation will be accepted, and the excursion party will probably leave Omaha early next month.

—There is sharp competition now between the Pacific Mail steamers and the overland line to California. Both parties are cutting under, and carrying freight at less than the cost of transportation. The railroad has taken freight, in several instances, at $3 per hundred pounds, and the steamship company has signed through bills of lading at $2 per hundred for the same class of freight. So active is competition that freight can be sent cheaper from New York to San Francisco, than from Chicago or Omaha.

—The Philadelphia, Wilmington & Baltimore Railroad Company is replacing its iron rails with steel.

Chicago Railroad News.

Freight Rates.

As was to be expected, after the announcement of peace between the New York Central and Erie, the rates on westward bound freight have been considerably advanced. The rates last week were 50 cents for First, Second, Third, and Fourth classes and 40 cents for special. According to the new tariff, which went into effect last Monday, the rates are as follows: First class, $1,00; second class, 90 cents; third class, 70 cents; fourth class, 55 cents; special, 45 cents.

The rates on eastward bound freight have so far remained unchanged, but a considerable advance will be made next week. The business *via* the through freight lines has been been extraordinarily large for the past few weeks.

The following is a list of the new first-class freight rates adopted on the three roads from New York to leading Western cities.

New York to	Per cwt.	Former price.
Cleveland	$ 63	$ 32
Columbus, O	77	40
Cincinnati	90	48
Indianapolis	92	47
Evansville	1 10	57
Louisville, Ky	1 12	60
St. Louis, Mo	1 25	67
Quincy, Ill	1 25	67
St. Joseph, Mo	1 72	1 14
Chicago, Ill	1 00	50

The following are the rates by steam by way of the lakes:

		Former rate.
To Detroit, Cleveland and Toledo	$ 63	$ 30
To Chicago and Milwaukee	71	35

Canal Navigation.

W. A. Gooding, General Superintendent of the Illinois & Michigan Canal, announces that, in pursuance of an arrangement between the Board of Public Works of Chicago and the Board of Trustees of the canal, navigation on the canal will be suspended on and after the 8th of October next, in order to facilitate the completion of the deep cut.

Chicago & Northwestern.

During the present week the general offices have been removed from Ogden's Building, on the southwest corner of Lake and Clark streets, to Newberry's building, at the northeast corner of North Wells and Kinzie streets, and less than a block from the Wells street depot. The second and third floors of this building have been fitted up with large vaults and furnished for the convenience of the officers and the storage of the company's records. Mr. Wheeler, the General Freight Agent, and Mr. Stanwood, the General Ticket Agent, were established some weeks ago in offices over the Wells street depot, and Mr. Bliss, the Superintendent of Telegraphs, is also to be accommodated in that building.

REGISTER OF EARNINGS.

FOR THE SECOND WEEK IN AUGUST.

Chicago & Northwestern (1,157 miles), 1870		$372,770 00
" " (1,157 miles), 1869		234,528 00
Increase (16 per cent.)		$37,742 00
Chicago, Rock Island & Pacific (608 miles), 1870		$124,200 00
" " " (594 miles), 1869		116,866 00
Increase (6¼ per cent.)		$7,334 00
Milwaukee & St. Paul (936 miles), 1870		$119,180 00
" " (825 miles), 1869		109,407 00
Increase (9 per cent)		$ 9,773 00
Toledo, Wabash & Western (521 miles), 1869		$108,795 00
" " " (521 miles), 1870		101,677 00
Decrease (6½ per cent.)		$7,098 00
Michigan Central (424 miles), 1870		$75,115 30
" " (329 miles), 1869		72,886 64
Increase (3 per cent.)		2,228 66
Pacific of Missouri (355 miles), 1870		$76,493 00
" " (355 miles), 1869		65,630 00
Increase (16½ per cent.)		$ 10,863 00
St. Louis & Iron Mountain (210 miles), 1870		$32,036 00
" " " (210 miles), 1869		15,752 45
Increase (103⅛ per cent.)		$16,283 55

FOR THE FIRST TWO WEEKS IN AUGUST.

North Missouri (404 miles), 1870		$92,541 00
" " (404 miles), 1869		78,972 00
Increase (30½ per cent.)		$21,569 00

FOR THE THIRD WEEK IN AUGUST.

Michigan Central (329 miles), 1869		$75,373 56
" " (424 miles), 1870		74,299 84
Decrease (1½ per cent.)		$1,073 72

—A party of engineers, one of the number appointed on the part of the government, have commenced a survey of the James River & Kanawha Canal. They will begin sixty-four miles west of Buchanan, Va. (the western terminus of the present canal), and will proceed thence down the Greenbrier and New Rivers to the Kanawha. The party will be composed of fifteen persons, and it will take three months to complete the survey.

The War and Prussian Steel.

Thomas Prosser & Son, the United States agents of Krupp's cast steel works ask their patrons to pardon certain delays that occur in filling their orders. About two thousand of Krupp's workmen are in the Prussian army. In case of an early peace, these (or their survivors) will be at work again, and orders will be filled as promptly as ever.

Consolidation of Trunk Lines.

The Erie and New York Central Railroads have at length arranged to bury the hatchet, stop their ruinous war of excessively low freights, and to consolidate. Jay Gould, President of the Erie, so telegraphs to the Vice President of the Pennsylvania Railroad. This consolidation is an event of such magnitude as to demand more than a passing notice. The Erie controls a broad gauge line reaching all the way from New York to St. Louis, and its business is immense. The New York Central includes, it is said, five thousand miles of railroad east and west. This consolidation makes the united corporation so formidable that it is a question whether defensive measures will not have to be adopted against it by the various States through which its lines pass. The gauge of the New York Central, and all the lines in its interest, is four feet eight and a half inches, while that of the Erie and its connections is six feet. The two will, therefore, have still to be worked distinctly, notwithstanding the consolidation. Neither engines nor cars can be used in common. The only object of the consolidation is monopoly. Competition was the thing to be stopped, and it could only be done by both lines being put under one ownership. Hence Vanderbilt has been grasping at the Erie by every means in his power, and Gould and Fisk, after thwarting him at every turn, and enriching themselves beyond their most sanguine expectations, have now made peace and agreed to consolidate, by which process they will become still richer, and get rid of all their law suits and other troubles.

Notwithstanding all the charges so freely made against Gould and Fisk, the Erie Railroad, under their management, is, beyond all question, in far better condition than it ever was before, and their competition with the New York Central has been managed with exceeding ability and success. Their attempt to compete with the Pennsylvania Central was a failure. Latterly the two have been working in harmony against Vanderbilt's roads. But with this consolidation there comes up a new and formidable complication, the end of which it is not easy to foresee. Our own road is strong, financially and otherwise. Its command of resources is unlimited, and in its field it will not be easy to shake it.

But, as a competitor for the trade of New York city, our road will now have to encounter an opposition such as it never had before. We must candidly say that this bodes no good to the trade of Philadelphia; for if the two New York lines, in the fury of competition, should reduce their freights to a ruinously low figure, our line would be compelled either to follow suit or abandon the New York trade. If our company were to enter into this competition the result would be that it would carry freights between New York and the West cheaper than between Philadelphia and the West. If our company were to withdraw entirely from the New York trade, the consolidated lines would at once raise their freights to monopoly terms, and New York would suffer. So far, therefore, as the interests of Philadelphia are concerned, it would be most desirable that the Pennsylvania Central should follow the example of the Baltimore & Ohio and concentrate its whole attention on its terminal city. The result of this, however, would be a great loss of trade to the Camden & Amboy and New Jersey Central lines.

Formidable as this consolidation seems, it is yet a fact that the interests concerned in the combination of which the Pennsylvania Railroad is the centre, are supreme in New Jersey, Pennsylvania, Ohio, Indiana, and some other States. Our connections are also making rapid progress in Minnesota, Illinois, Kentucky, Maryland and Virginia, and it is probably this immense expansion that excites the New York companies to consolidate their interest to make headway against it. We had our hands full in contending against the new schemes of the Baltimore & Ohio Railroad Company, and now this new complication comes in to increase the trouble. The effect will be the same now as heretofore. It will produce new absorptions of connections and extensions by the Pennsylvania Central, and writers for the press will hold up their hands in astonishment at the increase of a power that goes ahead thus only in self-defense.

No doubt the probability of the Northern Pacific Railroad being built in the interest of this line, has had the effect of stimulating this consolidation in New York. But the value of that connection is purely prospective, while the southern extension to which the company has turned its attention will be of immediate value. We have also an interest in the through line from St. Louis to Denver, *via* the Missouri Pacific and Kansas Pacific. If a war of freight tariffs is to go on between the New York lines, our own experience has shown that our line is able to stand it as long as any, and perhaps better. It is to be regretted, however, that the way business has to pay heavily for these contests, as all the expenses of the line in such cases are raised on it.—*North American and United States Gazette.*

The French Military Telegraphs.

The French army is provided with the means of telegraphic communication, and the following short account of the apparatus adopted may not be uninteresting:

The batteries employed are cased in felt and fitted with bungs, and sawdust is employed to contain the necessary salts and acids. The apparatus used is that of Morse, and it is placed in a box with a galvanometer and a lightning arrester, to protect the operator during storms. The conductors are covered with gutta percha, so that they may be laid on damp grass or even in water. The telegraph carriage is formed in two compartments, that in front, being like the coup of a railway carriage, serves for an office, while in the after part it carries the reel of the wire. In the office there is a table, which supports the instrument, two accumulators, one for the batteries and the other for the signal bells, and a seat with places for two persons. The reel is supported by its axles in two parallel iron bars in the back compartment, so that the conductor is given out as the carriage proceeds on its way. This reel carries three kilometres of wire (nearly two miles), and extra reel carriages are provided, which carry each twenty-one kilometres, or rather more than thirteen miles, and on seven reels. For mountainous countries the carriage is replaced by mules; one of the animals carries a small square tent, a tripod table, the battery, a stake, and a bag of necessaries—the whole being arranged in drawers in two cantines, so that everything may be got at instantly without unloading. A second mule carries two reels of wire, one on each side of the *bat;* two other reels are carried on a barrow, which serves for a reel frame, and which is drawn by another mule, and guided, and sometimes carried over difficult places by two men.

Each telegraph sergeant is in charge of a carriage, two corporals and twelve men, who are divided into three groups. One group goes ahead with the sergeant, who traces the line; where poles are used this party makes the holes, and if the conductor is to be laid on the ground it cuts the trench; the second party has charge of the reels and makes the splices, and the third group lays it in the ground or fixes it on the poles. When the latter are used they are generally placed about fifty or sixty metres apart. The officers in charge of the telegraph make a preliminary survey, and lay down the general course, for the sergeant and his men; they are answerable for the service, and are bound to inspect the apparatus and *materiel* daily. The time occupied in laying a cable or sunken wire on flat ground is about an hour for three miles, but when erected on posts it takes more than twice that length of time; and when the ground is rugged and sloping, of course progress is comparatively slow. When the telegraph has done its work it can be removed almost as quickly as the men can walk over the ground.—*London Engineer.*

The Pennsylvania Law of Compensation for Injuries Caused by Railroad Accidents.

In the State of Pennsylvania there is a law defining the liabilities of railroad companies and authorizing them to issue policies of insurance for the benefit of their passengers. The law reads thus:

"When any person shall sustain personal injury or loss of life while lawfully engaged or employed on or about the road, works, depots and premises of a railway company, or on or about any train or car therein or thereon, of which company such person is not an employee, the right of action and recovery in all such cases against the company shall be such only as would exist if such persons were an employee. *Provided*, That this section shall not apply to passengers.

"In all actions now or hereafter instituted against common carriers or companies owning, operating or using a railway as a public highway, wherein steam or other motive power is used, to recover for loss and damage sustained and arising either from personal injuries or loss of life, and for which, by law, such carrier or corporation could be held responsible, only such compensation for loss and damage shall be recovered as the evidence shall clearly prove to have been pecuniarily suffered or sustained, not exceeding in case of personal injury, the sum of $3,000, nor in case of loss of life the sum of $5,000.

"It shall be lawful for such carrier or corporation to insure the lives and persons of passengers against loss or injury from accidental causes, and however happening, while in their charge, and for that purpose to issue and sell to such passengers applying for the same, tickets or policies of insurance, specifying the name of the insured, the premium charged, the particular trip or time covered by the policy, and the amount insured, not exceeding (except at the option of the said carrier or corporation) the sum of $25 for each week of disability, for a period not longer than twenty-six weeks, in case of personal injury; not more than $10,000 in case of death, and all premiums so received shall be kept separate and apart from the other receipts of said carrier or corporation, and shall not be liable for any other claim, debts or demands against such carrier or corporation than those arising out of said policies, and the amount of said premium; and the securities in which the same are invested for the benefit and protection of such policy holders shall be reported to the Auditor General annually as a part of the operations of such carrier or corporation as is now provided by the act entitled "An act to require railway companies to make uniform reports to the Auditor General," approved April 4, 1859. *Provided*, nevertheless, that it shall be lawful for any such carrier or corporation, in lieu of issuing tickets as aforesaid, to keep on sale at their ticket office, the policies of insurance or indemnity against personal injury or death resulting from accidental causes issued by insurance companies incorporated for any such purposes, as shall have an actual bona fide cash capital invested in securities approved by the Governor, State Treasurer, and Auditor General of this Commonwealth of at least $200,000. *Provided*, That a recovery upon any policy issued or sold under the provisions of this act shall be no bar to a recovery under the provisions of the second section of this act.

"All acts or parts of acts inconsistent herewith, be and the same hereby are repealed, and any provisions in the acts incorporating such common carriers or corporations inconsistent herewith, shall be repealed upon the acceptance of the provisions of this act by such carriers or corporations, and upon the acceptance of the provisions herein by any carrier or corporation, the same shall become a part of the act of incorporation."

—The Paterson *Press* says: "The reconstruction of Rogers' Locomotive and Machine Works will not be carried any further this year. The immense new mill lately erected is gradually getting into operation, and in a few months will probably be entirely in use. It is driven by one of the finest overshot wheels in the city—an 80-horse power affair. The next rebuilding, it is thought, will be at the corner of Market and Spruce streets, but that will not be started before next spring."

The Dubuque & St. Paul Railroad.

The Vice-President of the Illinois Central Railroad, Mr. Newell, and the Chief Engineer, Mr. Clark, are in this city for the purpose of conferring with the officers and engineers of the St. Paul & Dubuque Railroad, and completing arrangements for the construction of that line as soon as the necessary bonuses shall have been subscribed by the towns on this route. They spent all day yesterday in examining the profiles and maps of the surveys which have just been completed under the direction of Mr. McNamara, from the State line to Cannon Falls. The surveys show a very favorable route, through Mantorville, which has therefore been adopted as the line. The route this side of Mantorville is not fully decided upon. Two routes have been examined—one bearing west of Mantorville, through the townships of Concord, Cherry Grove, Wanamingo, etc., which runs through a rather flat country, and on the most direct line to Cannon Falls, while the other turns eastward through Pine Island, Zumbrota, etc. The country embracing this tier of townships is more rolling, but is also more populous, and richer, and the preliminary line intersects several valuable water powers and thriving towns. At Pine Island there is a flour mill which turns out some 600 barrels of flour per day. Messrs. Newell and Clark are going to inspect both these routes from Cannon Falls to Mantorville, and determine which will be more advantageous to the interests of the company to adopt. Meanwhile the surveys are to be immediately pushed forward from Cannon Falls to this city, and it is expected that the most feasible route will be found in a nearly direct line to Pine Bend and thence to West St. Paul. Messrs. Newell and Clark were yesterday inspecting the shores of the Mississippi in front of the city, at various points, with a view to ascertain the most advantageous point for crossing the river with a railroad bridge, and were favorably impressed with the facilities for connecting the opposite shores of the river, and they are now negotiating for running connections with the roads centering at St. Paul. As there seems to be little doubt that the required bonusses for grading the road will be subscribed by the towns on the route, we are, perhaps, warranted in saying that the construction of this line is now assured, the Illinois Central Company having, we understand, given assurances that they would iron and complete the road on the conditions above mentioned. The length of the road from St. Paul to the State line due south from Austin, is 110 miles. At that point it connects with the Dubuque & Cedar Valley road, which is a continuation of the Illinois Central at Dunleith. Along its whole length, from St. Paul to the State line it will pass through the richest and most populous section of the State, dividing in equal parts the broad district, eighty miles wide at its broadest point, between the Milwaukee & St. Paul and the Mississippi River. Within this district are included the great, wealthy and populous counties of Houston, Fillmore, Mower, Winona, Olmsted, Dodge, Wabashaw, Goodhue, the greater portion of Dakota, and parts of Rice and Steele. A population of 200,000 is enclosed in these lines, with an annual wheat product of 12,000,000 bushels.

In addition to this local business, the road will derive an immense business from its connections with the numerous roads concentrating at St. Paul. Here, of course, we eagerly welcome every line of railroad which affords a new competing outlet and new facilities of commercial communication with the agricultural districts of the State, and we will be expected to and must do our share towards the development of this connection with the great Illinois Central line.

We understand further that Governor Marshall, the President of the Company, is going to-day to Austin to .et a contract for the construction of that part of the line between the State line and Austin. Its continuation beyond that point will, of course, depend upon the local subscriptions along the route.—*St. Paul Press.*

Fairlie's Latest.

Addison puts this speech in the mouth of his hero—

> "'Tis not in mortals to command success,
> But we'll do more, Sempronius—we'll deserve it."

Mr. Robert Fairlie certainly deserves success, and we have pleasure in believing that he is commanding it. On Thursday last and yesterday in the little "cabbage garden" at Hatcham another of his great triumphs was exhibited in the trial of the "Tarapaca," a double bogie locomotive of sixty tons weight, coaled and watered, destined for Peru. The experiments were witnessed by some hundreds of eminent official and scientific men, who were all in accord, in so far as we could hear, in their admiration of the new engine, which for hours in succession performed the feat, smoothly and with perfect success, of turning round the oval in the gardens, the end curves being of only 50 feet radius. The railway world has heard of Mr. Fairlie's "Little Wonder" at work upon the Festiniog Railway, and of the triumphs of the "Progress" on the Brecon & Merthyr Railway. The "Tarapaca" may properly be designated the "Great Wonder," in the adaptation of steam power to locomotive purposes. As stated, the engine is sixty tons weight in working order, or forty tons weight when empty; the bunker room is sufficient for 30 cwts. of fuel, and the tank accommodation is for 2,200 gallons of water, which should suffice for a sixty miles run. The weight is equally distributed upon twelve wheels, in two groups of six each. The wheels in each group are coupled together, so that all the twelve are driving wheels, and the whole of the sixty tons is thus made available for adhesion. The "Tarapaca" will have to work a gradient of 1 in 26 for eleven miles on the Iquiqui line in Peru, belonging to MM. Montero Freres. The engine has four cylinders of 15in. diameter and 20in. stroke. The wheels are 3ft. 6in. diameter, and the brake arrangement, very powerful, is applied to the four inner wheels of the twelve. The force of the engine at the rails is about 21,400 lbs., or 9⅗ tons, and equal to hauling a load of 2,000 tons, on the level, at a speed of twelve miles an hour.

The "Little Wonder" runs upon a guage of 1ft. 11½in.; the "Tarapaca" is made for the ordinary 4ft. 8½in. guage. The Fairlie engine can double the capabilities of any line, irrespective of gauge, its power being double that of engines of the ordinary type. The Festiniog gauge is unduly narrow, and the ordinary 4ft. 8½in. gauge is wider than is necessary to realize the maximum advantages of the Fairlie system, which may be secured with a gauge of from 3ft. to 3ft. 6in. A 3ft. gauge line worked upon this system may be made to carry as many passengers and as many tons of goods as the broadest gauge line in existence, and it can be worked in the ordinary manner, at a speed of from forty to forty-five miles an hour. The dead weight on narrow gauge lines is much less proportionately than on broad gauge lines. A wagon for a 3ft. gauge, weighing 1 ton, will carry 3 tons of paying weight. The best form of wagon on 4ft. 8½in. gauge weighs from 3 to 5½ tons, and carries from 5 to 10 tons, or about 1.90 tons per ton of wagon. The average load carried by merchandise wagons, exclusive of coal, is about 10 cwt. paying weight. The load these wagons ought to carry should be from 5 to 7 tons; of paying load they really carry but a twelfth of what they ought to do. If our goods and mineral wagons were only a ton in weight, as they ought to be, they would carry three tons of load, or six times the average load now taken, and would reduce the dead weight from 4 to 1. A railway company that we forbear from naming carries over its line 126 millions of tons per annum, out of which it takes payment for only 15 millions of tons of paying load. Fairlie's narrow gauge and 1 ton wagon system would reduce this gross tonnage one half, thus saving the company the cost of hauling 60 millions of tons per annum of dead weight. The experts who attended the trials at Hatcham on the last two days were agreed as to the entire absence of oscillation in the movements of the engine. The ordinary locomotive, it is well-known, increases its oscillation, as it increases its speed, and *ipso facto* increases the power and effect of the blows inflicted upon the rails. The oscillations of the engines are communicated to the trains they draw, and danger is thus increased. The Fairlie engine, it has been fully demonstrated, runs more smoothly and faster without the pounding of the rails caused by the engines of the ordinary type.

From all that we have seen of Mr. Fairlie's Big and Little Wonders in his double bogie engines for any gauge, but preferably for a gauge of say 3ft., we cannot doubt that the adoption of his inventions would revolutionize railway working and make the difference, as regards railway property, that there is between wasted money and lucrative investments. Ere long, notwithstanding the *vis inertia* of the directorial mind, we have little doubt that we will have English companies sharing with Russian, Peruvian, and Welsh mine-masters, in the benefits that Mr. Fairlie and his double bogie system are ready to confer upon them.—*London Railway News.*

Railroad Consolidation and the Consequences.

The tendency to consolidation of the great railroad lines and interests of the country has been apparent for some time past. This now begins to take place on a gigantic scale. The railroad kings, who control the principal lines, have ceased that rivalry which promised to be a benefit to the country by reducing the rate of fares and freight to the lowest paying figur , and are now combining with a view to increase their profits and vast fortunes at the expense of the public. The very significant telegraphic dispatch sent by Jay Gould to the Vice President of the Pennsylvania Central Railroad, the other day, shows what is taking place. Mr. Gould says: "I have arranged a consolidation with the New York Central, which, of course, requires the acquiesence of all competing lines. When can you come to New York?" We understand Mr. Gould says this "new consolidation affects every dollar of interest in the two roads." The New York Central and Erie railroads, and Vanderbilt, Gould and Fisk, are united in a common interest to keep up a high rate of fares and freight, and the Pennsylvania Central, as is seen by Mr. Gould's telegram to Mr. Scott, is invited to join the combination. With the terms of this arrangement, or as to which has made the greatest concessions, we are not informed. Nor do we think it of much consequence to the public, for this is a private matter among these railroad chiefs. But as to the fact and probable consequences of this consolidation the whole community is deeply interested.

Look at the thousands of miles of railroads the great trunk lines of Erie and the New York Central embrace and control, Look at the area of country they stretch over, the many millions of people, with all their vast agricultural, manufacturing and other material interests, dependent upon these roads and their connections for transportation. Then add to this combination the Pennsylvania Central, with its branches and ramifications, and we see the most stupendous monopoly that ever existed in the hands of four or five men. Nor is it likely the consolidation will go no further. The Baltimore & Ohio line and its branches may be brought into this common interest. Indeed, it is difficult to conjecture how far this consolidation may go, unless either the government of the several States or the Federal Government interpose. The three great trunk lines named, with their connections represent a capital, probably, of not less than six or seven hundred millions of dollars. The income they draw from the people for travel and freight is enormous. Ten per cent., more or less, of charges, makes a vast difference to the public. Ten per cent. addition would be an oppressive direct tax on the whole community; for there is not a man, woman or child who is not depended upon or affected by the railroads, either directly or indirectly. All must use them, and all must pay whatever charges the managers choose to impose.

In this direct tax these railroad kings are irresponsible, and study only their own interests. Their power is as great in this respect as that of the National Gorvernment itself. It may be said, perhaps, that the interest of the railroad companies is identical with that of the public; but these companies do not look at it in that light, and never have looked at it so. They do and will swell their incomes as much as possible at the expense of the public, unless restrained by the hand of Government.

There is danger, then, in the consolidation of these great railroad lines—danger to the pockets of the people, to the progress and material interests of the country, and in the end, possibly, to the institutions of the republic. A great deal used to be said about the dangerous power of the old National Bank in President Jackson s time, and we hear, too, of the danger of the present national banks, as well as of other institutions and combinations; but none of these were or are fraught with so much evil as the stupendous railroad consolidation with which we are threatened. It is evident some thing must be done to check the growing power of the railroad monopolies, and to regulate their charges. The State of Illinois has taken a step to this end. She made a provision lately in her constitution to prevent railroad consolidation, and to check the growth of this gigantic monopoly. Other States might do the same, but we have little hope that many of them will do so. Is it likely, for example, that the Legislature of Pennsylvania will pass any law inimical to the interests of the Central Railroad of that State, when that road is all-powerful and controls legislation at Harrisburg? In fact, the Pennsylvania Central owns and controls the State as much as or more than the railroads of New Jersey do the State of New Jersey. The same remarks apply in a great measure to other States and their railroads. Beside, it is known that with the enormous wealth and power of the leading railroad lines, they can buy up and control the Legislatures whenever they choose. There is no effectual way of reaching these monopolies but through the general government. Congress must, sooner or later, and the sooner the better, make laws to regulate railroads and their charges. These roads are now the great arteries of internal commerce, as much as the rivers are, and Congress has power under the express provisions of the constitution "to regulate the commerce among the several States." As the lines connect and run through the different States, from one end of the country to the other, it is certainly the duty of the national government to make laws for controlling and regulating the commerce through them, and thus protect the people in their intercourse and trade against a dangerous monopoly. Let us hope that this new consolidating movement of the railroad kings will arouse Congress to a sense of the danger and its duty.—*New York Herald.*

The First Locomotive.

The Rondout, New York, *Courier* gives the following account of the first locomotive in America:

Not many of the present inhabitants of Rondout are aware that the first locomotives in America were brought here in 1829, on the sloop Eliza, then sailed by Charles McEntee. There were two of them sent from England in the ship George Canning, by Horatio Allen, then a young civil engineer in the Delaware & Hudson Canal Company's service, who had sent to England in 1827 to purchase four locomotives to be used on the company's railroad connecting the mines at Carbondale with the mines at Honesdale. Some months later two more engines arrived from England in the ship Elisha Hicks. Mr. Allen coming with them. They were put in two canal boats, towed up here by the old Congress and sent to Honesdale, where one was put on the track. Mr. Allen ran for a short distance up the trestle bridge and and up the road, and then backed it down. None of the locomotives were used after that, as they were declared too heavy for the road, although weighing only four tons each. The two that arrived first never were sent up the canal, but stood for years in a shed near where a store now stands, and were finally broken up and sold to James W. Baldwin—for old iron we believe.

Mr. Allen has the honor of being the man who ran the first locomotive in America. He is now one of the engineers of the East River Bridge. Thurlow Weed says the first locomotive run in America was on the Albany & Schenectady Railroad; but he is mistaken, for the company's road was built about three years before work was commenced on the Albany & Schenectedy—John B. Jarvis being chief Engineer of both works, going to take charge of one after completing the other.

—The Effect of the opening of the Pacific Railroad upon the traffic between Europe and the far East, is shown by the statistics of the Australian mails. When the line of steamers was established between Australia and San Francisco, the mail from Australia for Europe was sent by that route, thence across the United States, and by steamer to England. Mr. George S. Bangs, of the Post Office Department, arranged matters for the speedy transfer of these mails. On the 3d of August, 1869, the monthly mail from Australia, which passed over the new route, was about equal in bulk to three pecks. The mail for June, 1870, weighed four tons. The increase was regular. This route is a saving of about two weeks' time. We understand that, a few days ago, a party of English gentlemen passed through Chicago on their way to Australia, and that this route across the American continent is rapidly growing in favor among the business men of the Old World.—*Chicago Tribune.*

—The Mont Cenis Railway Company asks to have its affairs wound up on the ground that the expenses exceed the income. The losses during the winter months exceed the profits during the summer.

—The following telegram from New York attempts to explain some of the recent movements in the stock market:

"The sudden breaking out of war in Europe seriously interfered with the calculations of certain large operators in Wall street. There had been a formidable bull clique formed, which intended to run up stocks during the last week in July and the first week in August. The clique embraced Vanderbilt, Horace F. Clark, Dick Schell, and other leading people in the New York Central, Lake Shore, and Rock Island. The theory upon which they went to work was based on the fact that this year we have received ninety millions more than we exported, of which sixty millions was for cotton, and thirty millions for wheat. This ninety millions was substantially so much inflation in the business of the country. Government or bank expansion of fifty millions would have sent stock flying. Hence the larger sum received for cotton and wheat was expected to have a still more important effect. Upon this theory, the clique was loading up all summer with New York Central, Lake Shore and the related stocks, and as a consequence, it has suffered terribly by the rise in gold and the half panic in stocks which has resulted from the war."

—The Southern Minnesota Railroad has one hundred and twenty-five new freight cars, of their own manufacture, ready for use as soon as the connection is made between Lanesboro, the present terminus, and Ramsey, the point of intersection with the Milwaukee & St. Paul.

WANTS.

☞ SHORT ADVERTISEMENTS will be inserted under this head at ten cents per line for the first insertion, and five cents per line for each subsequent insertion.

WANTED—A Civil Engineer of considerable experience in this and the Old Country is open for an engagement as Divisional Engineer, or in any business connected with Surveying—unquestionable references. Address CIVIL ENGINEER, care of Editor RAILROAD GAZETTE.

WANTED—A man with several years' experience in a large manufactory at the East, three years as superintendent of foundry, boiler and machine shops, acquainted with the manufacture and purchase of supplies, would like employment in the machinery or purchasing department of some Western Railroad. A place with prospect of promotion if found worthy is of more importance than salary. Satisfactory reference as to ability, character and habits will be given. Address, GEO. W. ROGERS, 15 Lombard Block, Chicago.

WANTED—By a practical machinist, who has had considerable experience, and who has profited by it, a situation as engineer of a stationary engine, or employment in locomotive shops. He may be heard from by addressing "ENGINEER," at this office.

(From the Philadelphia "North American and United States Gazette.")

We publish in another place the recommendations of the Printing Inks manufactured by Mr. C. E. Robinson, at the Gray's Ferry Ink Works. We are using the inks from Mr. Robinson's works, and are pleased to add our approval of it to the many indorsements he has already received. The Ink is of excellent quality, clear, and works freely.

PRINTING INK.—We have tried most of the first-class printing inks made in this country, and know whereof we speak in recommending that manufactured at the Gray's Ferry Printing Ink Works, of Philadelphia, as superior to any in use. It is easily worked in all sorts of weather, is clear, clean, pretty, and in many ways far ahead of inks sold at higher prices. We are seconded in this recommendation by our pressman, in the correctness of whose judgement in matters pertaining to the press-room we have unlimited confidence.—*Pittsburgh Daily Gazette.*

After thoroughly testing your ink, both on job and newspaper presses, we can strongly recommend it to the printers of Ontario, as a cheap and serviceable article, superior in every way to the stock for which we have been paying an exorbitant price during the past few years. It is an excellent black, clear, flows freely, and distributes easily on rollers; while on poster work it dries so much faster, as to render it an immense improvement on the oily substance which has been in use heretofore. We consider it the cheapest and best article in the market.—*From the Port Hope Times, Province of Ontario, Canada.*

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TRAINS LEAVE WELLS STREET DEPOT AS FOLLOWS:

8:15 A. M. Cedar Rapids Pass | **9:15 P. M.** Night Mail.
10:30 A. M. Pacific Express. | **9:15 P. M.** Rock Island Pass.
10:30 A. M. Rock Island Exp. | **4:00 P. M.** Dixon Passenger.

For Sterling, Rock Island, Fulton, Clinton. Cedar Rapids, Boone, Denison, Missouri Valley Junction, Sioux City, Council Bluffs and Omaha, there connecting with the

UNION PACIFIC R. R.

For Cheyenne, Denver, Ogden, Salt Lake, the White Pine Silver Mines, Sacramento, San Francisco, and all parts of Nebraska, Colorado, New Mexico, Arizona, Wyoming, Montana, Idaho, Utah, Nevada, and the PACIFIC COAST.

FROM CHICAGO	Hours.	1st Class Fare.	FROM CHICAGO	Days.	1st Class Fare.
To OMAHA,.....	23	$20.00	To SACRAMENTO,.	4½	$118.00
" DENVER,.....	52	70.75	" SAN FRANCISCO,	5	118.00

TRAINS ARRIVE:—Night Mail, **7.00** a. m.; Dixon Passenger, **11.10** a. m.; Pacific Express, **3:50** p. m.; Rock Island Express, **3:50** p. m.; Cedar Rapids Passenger, **6:50** p. m.

FREEPORT LINE.

9.00 A. M. & 9.45 P. M. For Belvidere, Rockford, Freeport, Galena, Dunleith, and St. Paul.
4.00 P. M., Rockford Accommodation.
5.30 P. M., Geneva and Elgin Accommodation
6.10 P. M., Lombard Accommodation.
5:50 P. M., Junction Passenger.

TRAINS ARRIVE:—Freeport Passenger, **2:30** a. m., **3:00** p. m.; Rockford Accommodation, **11:10** a. m.; Geneva and Elgin Accommodation, **8:45** a. m.; Junction Passenger, **8:10** a. m.; Lombard Accommodation, **6:50** a. m.

WISCONSIN DIVISION.

☞ Trains leave Depot, cor. West Water and Kinzie Sts., daily, Sundays excepted, as follows:

10.00 A. M. DAY EXPRESS, for Janesville, Monroe, Whitewater, Madison, Prairie du Chien, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Neenah, Appleton, and Green Bay.
3.00 P. M., Janesville Accommodation.
5.00 P. M. NIGHT EXPRESS, for Madison, Prairie du Chien, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Menasha, Appleton, Green Bay, and THE LAKE SUPERIOR COUNTRY.
5.30 P. M., Woodstock Accommodation.
6:20 P. M., Barrington Passenger.

TRAINS ARRIVE:—5:30 a. m., **7:45** a. m., **10:10** a. m., **1:00** p. m. and **7:15** p. m.

MILWAUKEE DIVISION.

MILWAUKEE MAIL,.....		8:00 A. M.
EXPRESS, (ex. Sun.) Waukegan, Kenosha, Racine and Milwaukee,.....	9:45 A. M.	5:00 P. M.
EVANSTON PASSENGER,.....		11:40 A. M.
HIGHLAND PARK PASSENGER,.....		1:15 P. M.
MILWAUKEE ACCOMMODATION, with Sleeping Car attached.....		11:00 P. M.
EVANSTON ACCOMMODATION, (Daily,) from Wisconsin Div. Depot.....		1:30 P. M.
KENOSHA ACCOMMODATION, (Sundays excepted) from Wells St. Depot.....		4:15 P. M.
AFTERNOON PASSENGER, from Milwaukee Div. Depot.....		5:00 P. M.
WAUKEGAN ACCOMMODATION, (except Sundays) from Wells St. Depot.....		5:25 P. M.
WAUKEGAN PASSENGER, (Sundays excepted) from Wells St. Depot.....		6:15 P. M.

TRAINS ARRIVE:—Night Accommodation, with Sleeping Car, **5:00** a. m.; Day Express, **4:10** p. m. Milwaukee Mail, **10:10** a. m.; Afternoon Passenger, **8:00** p. m.; Waukegan Accommodation, **8:25** a. m.; Kenosha Accommodation, **9:10** a. m.; Evanston Accommodations, **1.40** and **4.00** p. m.; Waukegan Passenger, **7:55** a. m.; Highland Park Passenger, **3.45** p. m.

PULLMAN PALACE CARS ON ALL NIGHT TRAINS.

THROUGH TICKETS Can be purchased at all principal Railroad Offices East and South, and in Chicago at the Southeast corner of Lake and Clark Streets, and at the Passenger Stations as above.

H. P. STANWOOD, Gen. Ticket Agt. — **GEO. L. DUNLAP,** Gen'l Supt.

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CHICAGO, RACINE & MILWAUKEE,

— TO —

Beloit, Savanna, Clinton, Pt. Byron, Davenport, Mineral Point, Madison, Freeport, Fulton, Lyons, Rock Island, Sabula, Galena, Dubuque, Des Moines, Council Bluffs,

OMAHA, SAN FRANCISCO

AND ALL PRINCIPAL POINTS IN

Southern and Central Wisconsin, Northern Illinois, and Central and Northern Iowa.

FRED. WILD, Gen. Ticket Agent. — **D. A. OLIN,** Gen. Superintendent.

CRERAR, ADAMS & CO.,

MANUFACTURERS AND DEALERS IN

Railroad Supplies!

—AND—

CONTRACTORS' MATERIAL.

11 and 13 Wells Street,

CHICAGO, ILL.

Manufacturers of IMPROVED HEAD-LIGHTS for Locomotives, Hand and Signal Lanterns, Car and Station Lamps, Brass Dome Casings, Dome Mouldings, Cylinder Heads, and Car Trimmings, of Every Description

Pan-Handle

—AND—

Penn'a Central Route East!

☞ SHORTEST AND QUICKEST ROUTE, VIA COLUMBUS, TO ☜

PITTSBURGH, BALTIMORE, PHILADELPHIA & NEW YORK

On and after Saturday, JULY 10th, 1870, Trains for the East will run as follows:

[DEPOT CORNER CANAL AND KINZIE STS., WEST SIDE.]

8:10 A. M. DAY EXPRESS. [SUNDAYS EXCEPTED.] Via Richmond. Arriving at

COLUMBUS	2:35 A. M.	HARRISBURG..	10:35 P. M.	NEW YORK....	6:40 A. M.	WASHINGTON..	5:50 A. M.
PITTSBURGH..	12:00 M.	PHILADELPHIA	3:10 A. M.	BALTIMORE....	2:30 A. M.	BOSTON.....	5:05 P. M.

7:40 P. M. NIGHT EXPRESS. [SATURDAYS EXCEPTED.] Arriving at:

COLUMBUS..	11:15 A. M.	HARRISBURG..	5:10 A. M.	NEW YORK...	12:10 P. M.	WASHINGTON.	1:10 P. M.
PITTSBURGH..	7:05 P. M.	PHILADELPHIA,	9.35 A. M.	BALTIMORE...	9:00 A. M.	BOSTON.....	11:50 P. M.

Palace Day and Sleeping Cars

Run Through to COLUMBUS, and from Columbus to NEW YORK, WITHOUT CHANGE!

ONLY ONE CHANGE TO NEW YORK, PHILADELPHIA, OR BALTIMORE!

CINCINNATI & LOUISVILLE AIR LINE SOUTH.

42 Miles the Shortest Route to Cincinnati,
18 Miles the Shortest Route to Indianapolis and Louisville.

—FROM ONE TO—

2 Hours the Quickest Route to Cincinnati!

THE SHORTEST AND BEST ROUTE TO

Columbus, Chillicothe, Hamilton, Wheeling, Parkersburg, Evansville, Dayton, Zanesville, Marietta, Lexington, Terre Haute, Nashville,

ALL POINTS IN CENTRAL & SOUTHERN OHIO, & INDIANA, KENTUCKY & VIRGINIA.

— QUICK, DIRECT AND ONLY ALL RAIL ROUTE TO —

New Orleans, Memphis, Mobile, Vicksburg, Charleston, Savannah,

AND ALL POINTS SOUTH.

Cincinnati, Indianapolis and Louisville Trains run as follows:

THROUGH WITHOUT CHANGE OF CARS!

8:10 A. M. (Sundays excepted) Arriving at		7:40 P. M. (Saturdays excepted.) Arriving at	
LOGANSPORT.....	1:15 P. M.	LOGANSPORT.....	1:30 A. M.
KOKOMO.....	2:33 P. M.	KOKOMO.....	2:45 A. M.
CINCINNATI.....	9:30 P. M.	CINCINNATI.....	10:30 A. M.
INDIANAPOLIS	5:00 P. M.	INDIANAPOLIS.....	5:40 A. M.
LOUISVILLE.....	11:30 P. M.	LOUISVILLE.....	3:50 P. M.

Lansing Accommodation: Leaves 5:10 P. M. Arrives 8:55 A. M.
Dolton Accommodation: Leaves 10:10 A. M. Arrives 3:25 P. M.

PULLMAN'S PALACE SLEEPING CARS!

Accompany all Night Trains between Chicago and Cincinnati or Indianapolis.

☞ Ask for Tickets via **COLUMBUS** for the East, and via **"The AIR LINE"** for Cincinnati, Indianapolis, Louisville and points South. Tickets for sale and Sleeping Car Berths secured at **95 RANDOLPH STREET, CHICAGO,** and at Principal Ticket Offices in the West and Northwest.

WM. L. O'BRIEN, Gen. Pass. and Ticket Agent, Columbus. — **I. S. HODSDON,** Northwestern Pass. Agt., Chicago.

D. W. CALDWELL Gen Supt. Columbus.

KANSAS PACIFIC RAILWAY.

Great Smoky Hill Route,

Now Completed and Open for Business Through to

DENVER, COLORADO,

There Connecting with the DENVER PACIFIC RAILROAD for CHEYENNE, forming, in Connection with the UNION and CENTRAL PACIFIC RAILROADS, another ALL-RAIL ROUTE to

CALIFORNIA, NEVADA, UTAH, MONTANA,

WYOMING, COLORADO, &C.

The most available Passenger and Freight Route to Lawrence, Topeka, Junction City, Abilene, Salina, Hays, KIT CARSON, River Bend, DENVER, CHEYENNE, OGDEN, SALT LAKE CITY,

Sacramento, and San Francisco.

☞ Close Connections are made in Union Depots at KANSAS CITY and STATE LINE with Express Trains of the HANNIBAL & ST. JOSEPH, NORTH MISSOURI and MISSOURI PACIFIC RAILROADS.

Southern Overland Passenger and Mail Coaches leave Kit Carson daily for Pueblo, Trinidad, Fort Union, Santa Fe, &c.

Hughes & Co.'s Splendid Concord Coaches leave Denver daily for Central City, Georgetown, &c.

Passenger and Freight Rates always as low and conveniences as ample as by any other Route.

PULLMAN'S PALACE CARS ACCOMPANY NIGHT EXPRESS TRAINS.

Through Tickets can be obtained at all principal ticket offices. Be careful to ask for tickets via Kansas Pacific Railway, "Smoky Hill Route."

5,000,000 Acres of Farming Lands For Sale!

Situated along the line of this Great National Railway. For particulars, address JNO. P. DEVEREUX, Land Commissioner, Lawrence, Kansas.

R. B. GEMMELL, Gen. Freight & Ticket Agt. — **A. ANDERSON, Gen. Supt.**

LAKE SHORE
—AND—
MICHIGAN SOUTHERN R.W.

THE GREAT THROUGH LINE BETWEEN

CHICAGO, BUFFALO & NEW YORK,

WITHOUT CHANGE!

AND THE ONLY RAILWAY

RUNNING PALACE COACHES THROUGH!

—BETWEEN—

CHICAGO & NEW YORK, via BUFFALO

☞ WITHOUT TRANSFER OF PASSENGERS! ☜

All Trains Stop at Twenty-Second Street to Take and Leave Passengers. Baggage Checked at that Station for all Points East.

4 EXPRESS TRAINS DAILY, [Sundays Excepted,] Leave Chicago from the New Depot, on Van Buren St., at the head of La Salle Street, as follows

7:30 A. M. MAIL TRAIN.
VIA OLD ROAD AND AIR LINE. SUNDAYS EXCEPTED.

Leaves 23d Street 7:45 A. M. Stops at all Stations. **Arrives**—Toledo, 6:20 P. M.

11:30 A. M. SPECIAL NEW YORK EXPRESS,
-A AIR LINE. SUNDAYS EXCEPTED.

Leaves—Twenty-Second Street, **11:45 A. M.** **Arrives**—Elkhart, 2:55 P. M.; Cleveland 10:40 P. M.; Buffalo, 4:10 A. M.; New York, 5:30 P. M.; (Chicago Time) Boston, 11:45 P. M.

This Train has PALACE SLEEPING COACH Attached, Running

THROUGH TO ROCHESTER, WITHOUT CHANGE!

IN DIRECT CONNECTION WITH

Wagner's Celebrated Drawing-Room Coaches on N. Y. Central R. R.

Only Thirty Hours, Chicago to New York!

5:15 P. M. ATLANTIC EXPRESS (Daily),
VIA OLD ROAD.

Leave—Twenty-Second Street **5:30 P. M.** **Arrives**—Laporte, 8:10 P. M. (Stops 20 minutes or Supper); arrives at Toledo, 2:50 A. M.; Cleveland, 7:25 A. M. (20 minutes for Breakfast); arrives at Buffalo, 1:50 P. M.; Rochester, 5:10 P. M. (20 minutes for Supper); connects with **Sleeping Coach running Through from Rochester to Boston Without Change,** making but **One Change between Chicago and Boston.**

NEW AND ELEGANT SLEEPING COACH Attached to this Train, Running THROUGH from CHICAGO TO NEW YORK WITHOUT CHANGE! Arrives at NEW YORK, 6:40 A. M.

9:00 P. M. NIGHT EXPRESS
VIA AIR LINE. (DAILY EXCEPT SAT. & SUN.)

Leaves—Twenty-Second Street, **9:15 P. M.** **Arrives**—Toledo, 6:00 A. M. (20 minutes for Breakfast); arrives at Cleveland, 10:35 A. M.; Buffalo, 5:30 P. M.; New York, 11:00 A. M.; Boston, 3:50 P. M.

KALAMAZOO DIVISION.

Leave Chicago 11:30 A. M. Arrive at Kalamazoo 6:05 P. M.; Grand Rapids, 9:25 P. M.

Leave Chicago 9:00 P. M. Arrive at Kalamazoo 6:50 A. M.; Grand Rapids, 9:40 A. M.

Elkhart Accommodation leaves Chicago, 3:30 P. M. Arrives at Elkhart, 8:20 P. M.

☞ There being no heavy grades to overcome, or mountains to cross, the road bed and track being the smoothest and most perfect of any railway in the United States, this Company run their trains at a high rate of speed with perfect safety.

☞ Travelers who wish to SAVE TIME and make SURE CONNECTIONS, purchase Tickets via

LAKE SHORE & MICHIGAN SOUTHERN R'Y.

THE ONLY LINE RUNNING THROUGH BETWEEN CHICAGO AND BUFFALO, WITHOUT TRANSFER, and in Direct Connection with NEW YORK CENTRAL RAILROAD and ERIE RAILWAY.

General Ticket Office for Chicago, No. 56 Clark Street.

CHAS. F. HATCH,
eneral Superintendent, CLEVELAND, OHIO

F. E. MORSE,
General Western Passenger Agent, CHICAGO.

ILLINOIS CENTRAL RAILROAD.

PASSENGER TRAINS LEAVE CHICAGO FROM THE GREAT CENTRAL DEPOT, FOOT OF LAKE ST

ST. LOUIS AND CHICAGO
THROUGH LINE.

9:30 A. M. DAY EXPRESS Sundays Ex,
Arriving in ST. LOUIS at 10:15 P. M.

☞ This Train Reaches St. Louis ONE HOUR & FIFTEEN MINUTES in Advance of any other Route! ☜

8:30 P. M. FAST LINE. Saturdays Excepted.
Arriving at ST. LOUIS at 8:00 A. M.

AT ST. LOUIS, Direct Connections are Made FOR

Jefferson City, Sedalia, Pleasant Hill, Macon, Kansas City,

LEAVENWORTH, ST. JOSEPH & ATCHISON,

—Connecting at KANSAS CITY for—

LAWRENCE, TOPEKA, JUNCTION CITY, SALINA, SHERIDAN, &c.

CAIRO, MEMPHIS AND NEW ORLEANS LINE.

9:30 A. M. CAIRO MAIL, Sundays Excepted.
Arriving at **Cairo** 2:30 A. M., **Memphis** 12:40 P. M., **Mobile** 9:40 A. M **Vicksburg** 9:30 A. M., **New Orleans** 11:10 A. M.

8:30 P. M. CAIRO EXPRESS, Except Saturdays.
Arriving at **Cairo** 3:15 P. M., **Memphis** 2:30 A. M., **Vicksburg** 5:00 P. M., **New Orleans** 1:30 A. M.

4:55 P. M. CHAMPAIGN PASSENGER,
Arriving at **Champaign** at 11:15 P. M.

☞ THIS IS THE ONLY DIRECT ROUTE TO

Humboldt, Corinth, Grand Junction, Little Rock, Selma, Canton, Grenada, Columbus, Meridian, Enterprise,

MEMPHIS, VICKSBURG, NEW ORLEANS & MOBILE.

At NEW ORLEANS, connections are made for

GALVESTON, INDIANOLA,

And all Parts of Texas.

☞ **NOTICE.—This Route is from 100 to 150 MILES SHORTER, and from 12 to 24 HOURS QUICKER than any other.**

THIS IS ALSO THE ONLY DIRECT ROUTE TO

DECATUR, TERRE HAUTE, VINCENNES & EVANSVILLE.

Peoria and Keokuk Line.

9:30 A. M. KEOKUK PASSENGER, Sun. Excepted.
Arriving at **Chenoa** 3:15 P. M., **El Paso** 4:05 P. M., **Peoria** 5:40 P. M., **Canton** 7:14 P. M., **Bushnell** 8:59 P. M., **Keokuk** 11:26 P. M., **Warsaw** 12:05 A. M.

Elegant Drawing Room Sleeping Cars

ATTACHED TO ALL NIGHT TRAINS.

Spacious and Fine Saloon Cars!

WITH ALL MODERN IMPROVEMENTS, RUN UPON ALL TRAINS.

BAGGAGE CHECKED THROUGH TO ALL IMPORTANT POINTS.

☞ For Through Tickets, Sleeping Car Berths, Baggage Checks, and information, apply at the office of the Company in the Great Central Depot, foot of Lake St.

Hyde Park and Oakwoods Train.

	LEAVE.	ARRIVE.		LEAVE.	ARRIVE.
HYDE PARK TRAIN,...	*6:20 A. M.	*7.45 A. M.	HYDE PARK TRAIN,....	*2:00 P. M.	*5:15 P. M.
HYDE PARK TRAIN...	*8:00 A. M.	*9.15 A. M.	HYDE PARK TRAIN,....	*6:10 P. M.	*7:35 P. M.
HYDE PARK TRAIN,..	*12:10 P. M.	*1:50 P. M.			

* Sundays Excepted.

W. P. JOHNSON, Gen. Pass. Agent. **M. HUGHITT, Gen. Supt.**